Pit and Quarry

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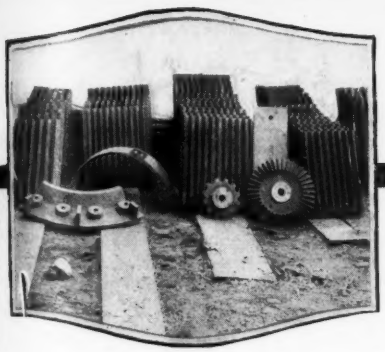
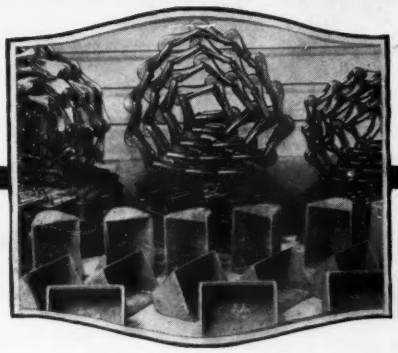
HANDLING - CRUSHING - SCREENING - WASHING





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July, 1923

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Circulation 7,300 copies

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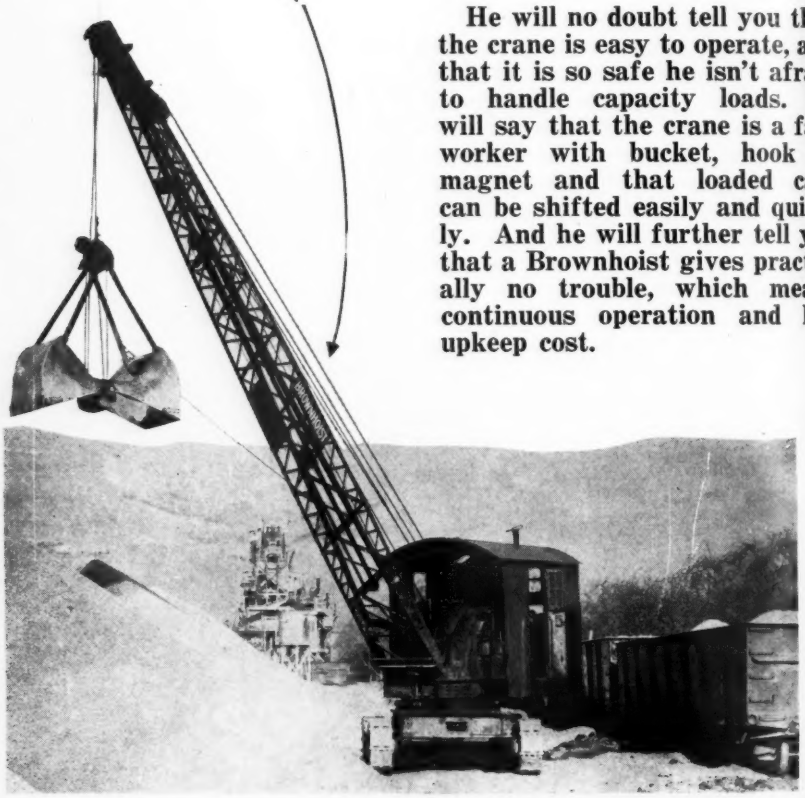
Ask any Brownhoist operator what he thinks of his crane. Inquire of him as to the crane's operation, capacities, speeds, engine, traveling mechanism, clutches and in fact every detail.

He will no doubt tell you that the crane is easy to operate, and that it is so safe he isn't afraid to handle capacity loads. He will say that the crane is a fast worker with bucket, hook or magnet and that loaded cars can be shifted easily and quickly. And he will further tell you that a Brownhoist gives practically no trouble, which means continuous operation and low upkeep cost.



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BROWNHOIST

MATERIAL HANDLING MACHINERY

Pit and Quarry

Member Audit Bureau of Circulations
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 7 CHICAGO, ILL., JULY, 1923 NO. 10

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E. S. HANSON Editor
D. J. HAUER, Associate Editor
J. J. FITZGERALD, Associate Editor

One of the Barber-Greene Conveyors whose work is described on this page. The photograph in the corner shows a Barber-Greene Bucket Loader loading trucks.

Increasing washed and screened gravel production 350 tons per day

By replacing a bucket elevator system with two Barber-Greene conveyors the White Marsh Sand and Gravel Company near Baltimore jumped up its production of washed and screened gravel from 50 tons a day to 400 tons.

And there have been no repairs since last July.

Two Barber-Greenes are used. One is a 96-foot permanent unit on which a 15 horse-power LeRoi engine drives the belt and 36 in. x 48 in. rotary screen.

The other is a 22-foot Portable and is used to load trucks from a ground storage pile. In another plant this company has a similar Barber-Greene installation.

The gravel handled is washed and screened and carried to bins or to a storage pile across the railroad track shown in the photograph reproduced above.

As hot weather reduces production

Because of high wages and keen demand the influence of warm weather in cutting down production will be more important than it has been for some years. The use of good conveyor installations that will make plants as independent of men as possible, will therefore be even more profitable than usual.

Even more than in other years, Barber-Greene installations in sand and gravel plants are increasing as the hot weather approaches. Men are scarcer than usual and the demand for production in many regions is stronger than usual.

Because of their flexibility and low repair cost, Barber-Greenes are therefore in even greater demand than usual for handling sand and gravel.

This increased use includes both large and small plants—and both primary and supplementary equipment.

Some recent installations handle the entire production of plants with Barber-Greene Bucket Loaders and Portable Conveyors.

In other cases, as in the one described above, the Barber-Greenes are supplementary equipment handling only part of the output.

For additional information about Barber-Greene Loaders and Portable Conveyors, and how they are being used to make up for the shortage and high cost of labor, send for our N cost reports and catalog.

Barber-Greene Company, 490 W. Park Avenue, Aurora, Illinois

Representatives in thirty-three cities

BARBER GREENE

Portable Belt Conveyors — Self Feeding Bucket Loaders

Pit and Quarry

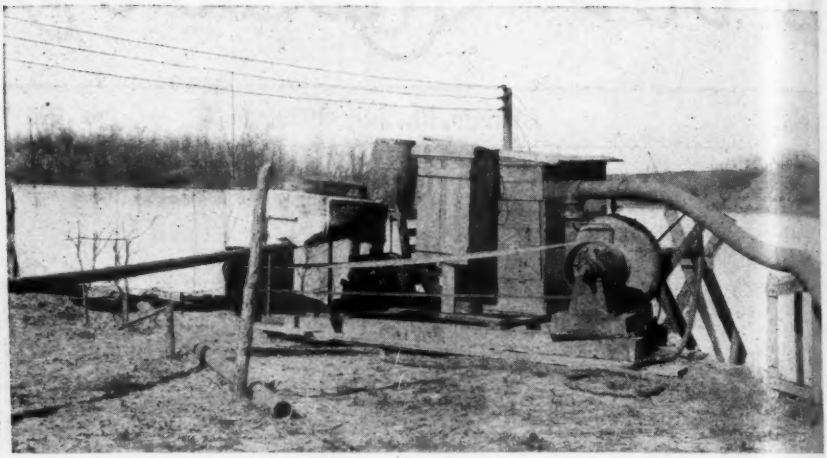
Vol. 7 Chicago, Ill., July, 1923 No. 10

For a number of years gravel and sand have been excavated from the property on which is now located the dredging operation of the Lincoln Sand and Gravel Company, Lincoln, Ill. This concern has, in fact, exerted a very appreciable influence upon the topographic character of the land on which the work is being conducted. They have made lakes and hills and hollows in the flat prarie country enclosed by their deposit and have removed a great amount of material for the highway and building activities of the section.

In Lincoln, named for the great Emancipator who practiced law here in his early days, is located the home office of the company. Here Mr. J. C. Brandt and "Buck" Weaver hold forth and lay plans to start more and more cars labeled with the familiar yellow signs, "Lincoln Sand" and "Lincoln Gravel," rolling in the direction of various jobs in their territory. That they do their work well is evidenced by the number of cars they keep rolling and by the number of those yellow signs that the purchasing agent has to provide. The signs by the way, are worthy of note. The distinguish the cars of Lincoln material in a train and undoubtedly result in an amount of desirable advertising.

Besides its use as a center of the company's sales activities, the home office also serves the purpose of an objective for the occasional flying trips of the president of the company, Mr. V. O. Johnston. They do say that Mr. Johnston's trips are very much of the occasional and the flying variety. But any sand or gravel producer who is a member of the National Sand and Gravel Association knows how much Mr. Johnston can accomplish on a trip, no matter how occasional or how flying.

But we were talking about signs. These signs are of light sheet metal, enameled. On one side they carry the legend, "Lincoln Sand," on the other "Lincoln Gravel." The sign is tacked to a lath which is stuck into the material, making an "ad" visible from all directions. Nothing new about the idea, but it is in our opinion a move in the right direction. If more producers would take the trouble to provide some such means of publicity



Water is supplied by another pumping unit.

for their products, those products would be better known to many potential customers.

The plant itself is located about 4 miles out of Lincoln, to which town it is connected by the company's right-of-way. Between Lincoln and the plant the company maintains a standard gauge railroad system along which they convey with their own locomotives all materials handled at the plant. This entails the necessity of keeping in repair over 7 miles of railroad track, but the expense of doing this is balanced by the economy and convenience that come with improved railroad facilities. A section gang is permanently employed at keeping the right-of-way in good condition.

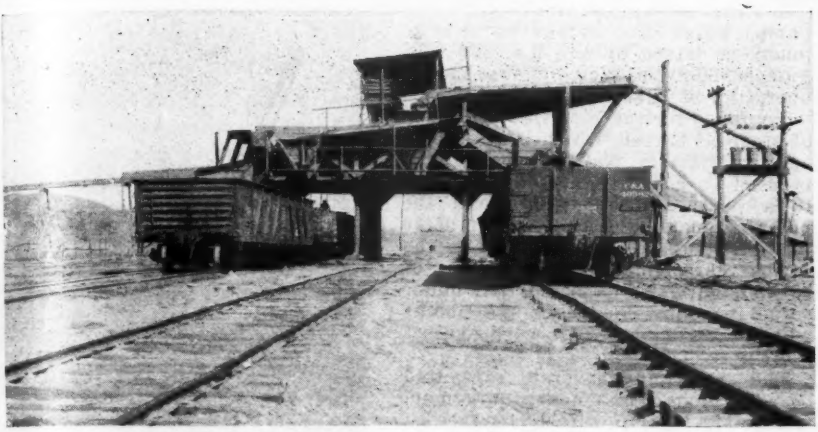
At the plant you meet Mr. H. E. Clouse, superintendent, who is there to tell you that the plant is ready at any time to back up the company's slogan, "one car or a trainload." Mr. Clouse is pretty busy these days getting the new dredging equipment in most efficient working order and maintaining harmony between this new dredging equipment and the washing and screening plant, erected before the improved excavating means were provided.

Operations have just been started on a part of the property which has, up to this time, been untouched. On this part enough ground has been stripped to insure a year's operation. On other parts of the company's 360 acres are places where excavating has been carried on extensively in the past. These three working places are connected in such a way as to form a single lake.

At the point where the present excavation is being carried on, there was a light overburden which was stripped off by a contractor. In the deposit is plenty of good material running about 75 per cent sand and good down to a depth of about 50 feet. The material is fairly compact and contains an amount of large stones which, while not sufficient in number to justify the installation of crushing equipment, are still sufficient to present an occasional problem to the pump operator. Under the desirable material is a ledge of lime rock. At the present time the dredge is working at a depth of 18 feet.

The dredge is 40 feet long, 20 feet wide, and draws 18 inches of water. It is well built and calked and should prove satisfactory in operation. All equipment on it is operated by electric motors, the electric current transmitted through a submarine cable from the point at which the company receives power from the local central station.

On the dredge is located the transformers necessary to step down the current from 2,200 volts to 220 volts. This section of the dredge is very carefully caged in to reduce the hazards that accompany working around this kind of equipment.



Side view of washing and screening plant.

The dredge is sufficiently roomy to allow freedom of action for the operators. Unique with the dredge construction is the careful study of the plant layout, and the placing of machinery. Centralized controls minimize unnecessary moves on the part of the operator and he can clearly see forward to the operation of the suction line. There is secured a proper distribution of weight with proper location of the center of gravity in relation to the dredge boat as a whole, giving good buoyancy and balancing effect. When a little time and forethought are given to this subject, benefits are derived in time to come because of the fact that the dredge is very easily handled under all operating conditions. One of the essential features to be given due consideration is that one does not have to step over, about and around fittings any more than necessary. The comfort of the operators is also kept in mind in other ways, for the boat is electrically lighted and provided with a telephone and other similar conveniences.

The craft and the mounting of the machinery located on it, are entirely the work of the company's own men.

Last year at the end of the operating season work was begun on the construction of the new dredge, and the men were given employment during the time when their services could not otherwise have been used. As a consequence, they know the equipment very well, because they were personally identified with the building of it. Since there is very little labor turnover at the Lincoln Sand and Gravel Company, there is a great advantage in this plan of having the men build the equipment with which they will work. The men who are actually working on the dredge are familiar with the smallest details of construction. The other men about the plant who are not actually employed on the dredge are, nevertheless, because of their familiarity with the excavating equipment, of greater use to the company.

Mr. Clouse makes the proud claim that any of his men is willing to go from one job to another on a minute's notice. Every man is, in a way a utility man and is not so obsessed with the idea that he is hired to do certain things that he cannot bring himself to do work which he did not specifically agree to do at the time he was employed.

The "A" frame is stationary. Control of the suction nozzle is had either through movement of the boom, or of the suction line hoist cable. Control of the nozzle and boom are obtained through a 3-drum hoist made by the American Hoist and Derrick Company. One drum is used for swinging the boom, one for raising and lowering the nozzle and one for controlling the shore lines which hold the dredge in place. Spuds are not used. The hoist is operated by a controller made by the Union Electric Manufacturing Company of Milwaukee, Wisconsin.

The dredging pump is primed by a size SS2 centrifugal water pump manufactured by the Dayton-Dowd Company of Quincy, Illinois. This

pump, which also serves as a bilge pump, is driven by a 5 h.p. 220 volt, 3 phase, 60 cycle, Westinghouse motor, operating at 1,150 r.p.m.

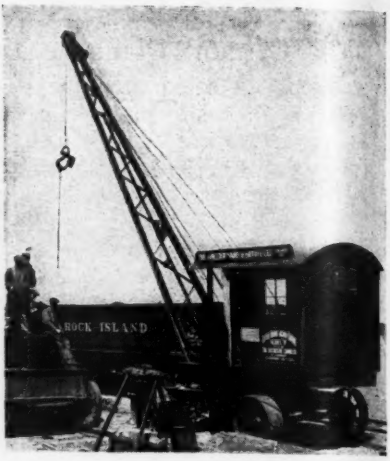
Pontoons for the pipe line are made of steel oil barrels which have proved very satisfactory. National dredge pipe is used to carry excavated materials to a point whose height gives the pumps a maximum working lift of 30 feet. During experimental work the dredge has pumped against a lift of 50 feet, but it is expected that under actual working conditions the pumps will not be employed to work against a lift of over 30 feet.

The sand and gravel is excavated by a 10 inch Amsco heavy duty manganese steel pump, directly connected to a 250 h.p. General Electric motor of slip ring construction, provided with resistance grids, permitting of 50 per cent speed variation control. The full load speed of the motor is 590 r.p.m.. A sturdy, well-designed, flexible coupling is employed, making connection between the pump and the motor. A feature of the pump construction is the main bearing layout. This bearing is of unusual length, with plenty of babbitted bearing surfaces. End thrust is cared for by the use of shaft of steamship propeller shaft construction having 4 flanged collars, forged integrally with the shaft. These bear against babbitted surfaces of an independent thrust housing for impeller adjustment in relation to the center line of the shell. A large screw bolt held in the bearing pedestal, engaged with fingers cast integrally with the bearing carriage, permits of easily and positively caring for pump alignment. One feature of this bearing is that parts can be easily and quickly removed, repaired and replaced.

This plant is designed to work at about a maximum radius of from 1,000 to 1,300 feet. Radius is commonly referred to as the horizontal distance from the front end of the dredge to the shore plant position.

After material is pumped to the end of the pipe line and is introduced into the plant process, its movement is controlled entirely by gravity. The plant of the Lincoln Sand and Gravel Company is of a type that appears to be the particular property of this section of the country. Mr. V. O. Johnston is a pioneer in the operation of a plant of this design.

The work is done without power.



Little Giant Crane to be used on stock pile.

The material spreads out first on an inclined, fan-shaped table, along which it is carried by the water to stationary screens set at 45 degrees to the horizontal. These screens take the large sizes and pass them to bins, allowing the fines to go ahead to wooden settling bins. Before entering the setting bins, the sand and water are passed over a series of wooden baffles which separate the coarser material, permitting the water and fine sand to go ahead.

The waste water, after it has been utilized in the washing process, overflows from the last settling bin into a flume at the end of the plant, along which it is carried to another flume that is built out to the old workings. The tail water is thus kept away from the lake where excavation is being carried on. Water that is taken out earlier in the process and which contains the heavier material is spouted back into the places where excavation is being done.

At the receiving end of the plant, provision is made for dropping the oversize stone into a bin, from which it is drawn off to fill occasional orders for such material.

During the operating season they will attempt to build up a stock pile to serve the needs of their trade during the months when the plant is not in operation. The building of this stock pile and the work of reclaiming from it will be handled by a Little Giant crane, made by the Locomotive Crane Company of America.

California Opposes State Cement Plant

IN CALIFORNIA we have the spectacle of the representatives of the people trying to put over something which the people themselves do not want. All expressions of local papers which have come to this office have been in opposition to the plan. Under the heading "Whither Does It Lead?" the Colton Courier says:

The senate of the state of California passed a bill making it legally possible for the State of California to enter into the manufacture of cement. Then the appropriation committee turned around and killed the bill by cutting off any appropriation for its operation. The net result of the whole thing is that a few senators have annoyed investors who have millions upon millions invested in this state for the sake of making a pitiable play for the labor vote.

The bill, it is acknowledged, was fostered by the federation of labor because the members of this federation claim cement companies are consistently non-union. That is obviously a matter for settlement between cement companies and their employes and is strictly no business of the state of California unless we change our state and federal constitution. Why then, this play of petty politics? Whither will it lead?

In the first place the state should, in our opinion, enter private manufacturing business only under stress of a great emergency. During the late war, the government very properly took over some industries in the emergency that then existed. Although we are still paying the bill of extravagance and waste, the emergency justified the move. But no such emergency exists or is in prospect in the state of California. Cement companies are furnishing material at a price that is admittedly far beyond competition on the part of the state or small corporations. These companies have never been accused of boosting prices beyond a reasonable margin of profit, have never shown any disposition to manufacture anything other than high grade material. In fact the cement companies have, at times, been almost alone in their fight for strict supervision of highways, for abolishment of political pull in appointment of inspectors or roads and have openly campaigned for such specifications in road building as will give the taxpayers a splendid highway. We believe the cement manufacturing plants of the state have a record of no little merit in this respect and have been given little or no credit for their efforts.

So, we feel, there is no condition existing anywhere in the state that would, in the least, justify such a radical move as the opening of a cement plant by the state.

Whither would it lead if we were to build such a plant? Would not there be just as logical a reason for opening railroad shops at the demand of dissatisfied workmen? Would it not be as reasonable to have the state take over a newspaper where such a newspaper is openly antagonizing certain labor elements? Surely men elected to make laws for the state can see where such a course would lead them. Any sensible corporation knows that efficiency is reached only when relations between employer and employe are pleasant but if this condition does not exist it is not up to the state to act.

The business of law making is a serious business. We do not believe this is a time for a play of politics but rather for serious consideration of needed legislation.

The San Bernardino Sun is another paper which opposes the plan, saying in the heading to its editorial that it wants "No North Dakota Policies." The editorial follows:

We would be willing to see almost anything done to break the combination that controls the price of cement, in California and elsewhere—that is anything short of following the example set by North Dakota, whose disastrous experiments in State ownership of banks and industries is not likely to be lost on the American public.

But there must be ways of dealing with the cement combination aside from going into competition with it. Both the State and the nation has anti-trust laws which forbid and threaten punishment for just the sort of combination that the cement makers of the land are presumed to be in. This is done so openly that they hardly take the trouble to deny it. Cement from

all mills is sold at the same price in Los Angeles, and the consumer can buy Colton or Victor cement cheaper in Los Angeles than in San Bernardino. Which ought not to be. The theory is that it is sold there on a delivered price, but consumers a few miles from the plant need not go to Los Angeles to get it.

But for all that, we pause at the suggestion in danger of becoming a law at Sacramento, which would appropriate $750,000 to start State-owned cement plants. The spectre of the North Dakota bank and elevator smash proves there are other things at least as bad as trade combinations. Besides, if half we hear from Sacramento is true, the State has no money to put into cement plants. It might spend less and "bust the trust."

Buy Cement By the Sack

It seems superfluous to speak about buying cement by the sack when, for many years, all of your cement has come to you in sacks, if you do not buy it in bulk. But through those years you have paid for it on the basis of a barrel containing four sacks. The customer is a holdover from early times, when barrels were actually used; and all quotations have been made on that basis, even long after no cement barrels were to be found on any job. One manufacturer, Marquette, has at last decided to do away with this anomalous situation and will hereafter quote prices on the basis of the sales unit involved. The cement buyer might well suggest that other manufacturers pull into line in the interest of less confusion. You use cement by the sack; then why not buy it by the sack and pay for it by the sack? Propose it to the next salesman who comes your way. —*American Contractor.*

The Universal Gypsum Co., Rotan, Texas, has been incorporated with a capital stock of $100,000. The incorporators are, C. E. Williams, L. Ford and J. V. Gray.

W. C. MacDowell, formerly manager mining sales department, Power and Mining Machinery Works of the Worthington Pump and Machinery Corp., has accepted the position of general sales manager of the Traylor Engineering Company, Allentown, Pa.

No Gravel Monopoly

Decision Says Buffalo Gravel Corporation is Not in Restraint of Trade

No monopoly exists in Buffalo in the production and sale of river sand, grit and gravel, according to the verdict rendered June 6 by the Supreme Court jury which for eight days had been hearing evidence on the alleged violation of the State Anti-Trust law by five corporations and three individuals. After deliberating four hours the jurors reported a verdict of not guilty in favor of each defendant.

It was the initial trial on indictments arising from the investigation by the Lockwood Housing Committee in June, 1921. There are pending indictments on a similar charge involving nearly 100 individuals and corporations engaged in the lumber, brick and mason supplies business.

The companies thus vindicated are: The Buffalo Gravel Corporation, the selling agency, and its subsidiaries, the Perry-Victoria Sand & Gravel Co., the Empire Limestone Co., the Niagara Sand & Gravel Co., the Niagara Sand Co., and the Squaw Island Sand & Gravel Corp.

The individuals whose names were cleared are: Samuel J. Dark, Daniel E. Knowlton and James E. Carroll, each of whom is president of one of the subsidiary companies and a director of the Buffalo Gravel Corporation.

The defendants were charged with creating a monopoly in the sand and gravel business in the Buffalo district in that the Perry-Victoria, Empire Limestone, Squaw Island and Niagara Sand companies in 1919 drew up a contract under which the Buffalo Gravel Corporation was organized as the selling company for all the others, which were to do nothing but produce sand, grit and gravel, and agreed to sell to no other company except the Buffalo Gravel Corporation. The Holloway Sand Company, which was the only other company engaged in this line here, was not included in the combination.

The defense claimed that this combination was effected at the behest of the war industries board and denied that it restrained trade or constituted a monopoly. It was asserted that the

unification was made as a means of meeting the increase in labor and costs by pooling boats, yards and truck fleets, and voluminous evidence was introduced to show that service had vastly improved under the combination. Strenuous attempts were made to get into the record evidence to substantiate the claim of the defense that the Buffalo Gravel Corporation sells gravel cheaper than any other company in the country, but the court would not permit comparative prices to be given. The defense, however, was successful in introducing evidence to show that the Buffalo Gravel Corporation sold cheaper than any other company in this district.

The verdict seems to have the approval of the people as expressed through the Buffalo newspapers. The Buffalo Commercial says editorially:

"The jury that freed the individuals and corporations charged with violating the Donnelly anti-monopoly law by entering into a contract whereby they controlled a substantial amount of the sand, grit and gravel taken from the Niagara river and carrying that contract out by doing acts in furtherance of it must have been impressed with these claims of the defense:

"That the contract was entered into in accordance with the advice and direction of the War Industries Board, which at a conference of sand and gravel producers held in Washington advanced the idea of consolidating the efforts of the producers to achieve economies to conserve the strength of the country.

"That the prices charged by the Buffalo Gravel Corporation were apparently fair with an excellent service to the consumers.

"That although sand, grit and gravel are essential commodities in the building industry there are other competing materials such as crushed stone, crushed slag and pit gravel.

"That there is an almost limitless supply of sand and gravel in the river and the lake which can be taken by anybody who sees fit to compete with the Buffalo Gravel Corporation.

"The prosecution proved, and it was conceded by the defense, that the defendants controlled 80 per cent of the sand, grit and gravel taken from Niagara river, and the law only requires the people to prove that such combination as the Buffalo Gravel Corporation represented was in a position to control a substantial amount of the essential commodity or commodities and to fix prices.

"Another thing too that probably had weight with the jury was the character of the individual defendants —their high standing in the community, their apparent honesty of effort and fairness. These were almost insurmountable obstacles for the prosecution."

The editor of the Buffalo Times is even more outspoken, saying:

"The acquittal of eight defendants in the now famous sand and gravel case in which five defendant companies and three individuals were charged with combination in violation of the State anti-trust laws, is sequel to the Lockwood activity of nearly two years ago.

"The public is well satisfied with the acquittal. The defendants are all reputable business men legitimately engaged. While it was shown that the combination existed it was claimed for it that it was formed to reduce costs of production and not for purposes of gouging the public, a contention that was well substantiated by unimpeachable testimony. Moreover it was shown that the combination as formed was passed as legal by a competent attorney and that the individual members entered it without a suspicion that it transgressed the law.

"While acquittal on these grounds may not square entirely with the law, as was pointed out by Judge North in his charge to the jury yesterday, it does square with common sense, which is the tape by which the honest layman measures right and wrong.

"What protection is there or can there be for the honest business man who follows the letter of his attorney's advice and still encounters trouble? True, this course might lead to great abuse. Unscrupulous men might easily engage unscrupulous attorneys to give them whatever advice fitted their nefarious schemes. The character of defendants and of the attorney should then form the basis of a jury's deliberations. In this case the defendants were business men of high standing and the attorney a respected member of the bar.

"In the circumstances the destruction of valuable property, and the blighting of character of unquestion-

ably good intent, would have distorted justice distressingly."

Testimony was unanimous in showing that the service given by the Buffalo Gravel Corporation was better than that formerly given by its subsidiaries. It was also shown that the corporation extended the helping hand to the Holloway Sand Company, its lone competitor, and was instrumental in enabling this company to weather financial storms after it changed hands in 1919, according to the testimony of Wallace Turbervill, president of the Holloway Company.

He declared that there had been no unfair competition engaged in by the Buffalo Gravel Corporation, that the company had once loaned equipment to the Holloway Sand Company and had sent its big tug out to pull the Holloway boat off shoals upon which it was stranded.

Among other evidences of friendly co-operation, the witness testified that the Holloway Company had been able to remain in business in 1919, because the Buffalo Gravel Corporation had taken care of some of the Holloway customers and had extended credit to the Holloway Company for six months. Mr. Turbervill said that the Holloway Company was in poor condition when he and some associates bought control of it in 1919 and while they were rehabilitating the company, they were given great assistance by the combination.

Frank X. Ernst, assistant treasurer, was examined relative to holding some gravel yards in reserve, after the combination was effected. He said this made possible great savings in coal, oil and labor.

Ernst testified about the business of the corporation. In 1919, he said, 265,000 cubic yards of sand and gravel were sold in Buffalo and 222,000 outside of Buffalo. Total sales in 1920 increased to 283,000 cubic yards in Buffalo and 292,000 outside of Buffalo, Ernst testified.

John E. Johnson, general contractor, who does heavy construction work such as grade crossings, etc., called as a witness, asserted that the organization of the Buffalo Gravel Corporation had improved service, in his experience.

Attorney Killeen in summing up for the defense, pictured the formation of the Buffalo Gravel Corporation as an honest effort on the part of the men owning it to continue economies forced upon business during the war without curtailing service. He said many of these economies were found to be good things by business men who had not employed them before the government forced them upon them to conserve the strength of the country for war purposes.

"These men should be commended not convicted for what they did," said Mr. Killeen. "This plan was beneficial to these men and to the public."

Mr. Killeen declared the price of gravel would have had to be raised 45 cents per yard if the Buffalo Gravel corporation had not been formed to achieve the big economies in eliminating the duplication of effort on the part of the four producing companies.

To Measure Fatigue of Stone

It has long been known that a load much below its apparent breaking strength would cause failure of stone after a long time. The Bureau of Standards is now undertaking a series of tests to determine the extent of this effect and to see how much load can safely be borne by stone for indefinite periods.

Samples of stone will be tested both in straight compression and in bending. Loads will be put on and left there, and the deflection of the stone will be measured from time to time.

Marble has the peculiar quality of sagging slowly, even under its own weight. Thus many cases are known in which marble slabs placed in horizontal position for a hundred years or so have sagged down several inches, and thin tombstones of marble have bent over.

China to Produce Cement

China is to meet her own demands for cement. According to a report from Consul J. K. Daves, Nanking, a new plant is being erected in the Yangtze Valley. This plant, midway between the two greatest markets of China, will have an initial output of four hundred 375-lb. barrels per day. The China Cement Manufacturing Co., the first to produce in this vicinity, has invested approximately $380,000 in the enterprise.

With the completion of this plant, which is to begin operations soon, and of another in Shanghai, China's demands for cement will be met by domestic production to a large extent.

Production of Stone in 1922

The stone produced in the United States in 1922 amounted to about 81,000,000 short tons, valued at $118,500,000, according to an estimate given out by the Department of the Interior from figures compiled by the Geological Survey. These figures show an increase of about 27 per cent in quantity and 11 per cent in value over the output in 1921. There was a good demand during the year for nearly all kinds of stone but the production of monumental and building stone, paving blocks, curbstone, and flagstone was somewhat restricted by labor troubles, which caused the closing of quarries and cutting plants, especially at the principal granite centers in the New England States. Trouble was also experienced in getting transportation for crushed stone and other stone products. The cost of quarrying was somewhat less in 1922 than in 1921, and prices were lower.

Building stone was in good demand, as is shown by an increase of 81 per cent in the output of limestone from the Bedford-Bloomington district, in Lawrence and Monroe counties, Indiana. This large increase was not shown throughout the country, but increases in other districts, in limestone, sandstone, and marble, and to a less extent in granite used as building stone indicated an output of 23,000,000 cubic feet—a total increase in 1922 of 35 per cent.

The stone sold for manumental work was apparently about the same as in 1921, but there was a decrease in the output of granite and an increase in that of marble.

Granite for paving blocks decreased about 20 per cent in quantity in 1922 as compared with 1921.

There was an increase in quantity of stone sold for curbstone, flagstone, and rubble, but a decrease in the quantity of that used for riprap.

The production of crushed stone, which represents over 50 per cent of the stone quarried, was estimated at 52,600,000 short tons in 1922, an increase of about 22 per cent. Crushed stone sold for use in road metal and in all kinds of concrete work increased about 24 per cent and stone sold for railroad ballast about 13 per cent.

The revival in 1922 of the metal-smelting industry increased the demand for stone for use as flux over 74 per cent. The estimated quantity of stone used for this purpose in 1922 was 18,595,000 short tons.

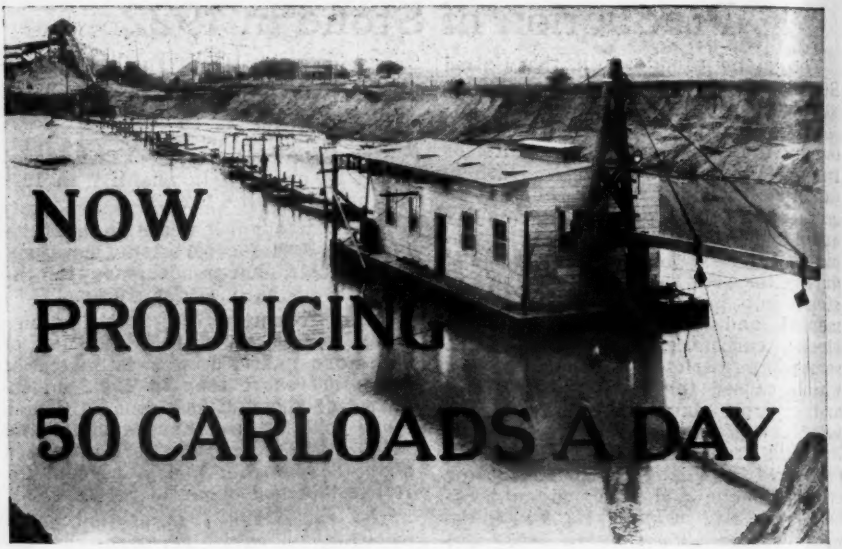
The stone sold for use as refractory material also increased in 1922 as did the stone, chiefly limestone, sold for use in the chemical industries.

The quantity of pulverized limestone sold for use in liming farm land was estimated at 1,180,000 short tons, a decrease of 10 per cent from 1921. The accompanying table shows the estimated output in 1922, and the totals in 1921, for comparison.

STONE SOLD IN THE UNITED STATES IN 1921 AND 1922

Use	1921 Quantity	1921 Value	Estimate for 1922 Quantity	Estimate for 1922 Value
Building stone, cubic feet	17,006,210	$18,975,819	23,000,000	$22,000,000
Approx. equivalent in short tons	1,368,650	.....	1,850,000	.....
Monumental stone, cubic feet	2,772,000	10,353,105	2,780,000	9,800,000
Approx. equivalent in short tons	230,000	.....	230,000	.....
Paving blocks, number	41,588,860	3,593,373	33,000,000	2,650,000
Approx. equivalent in short tons	453,130	.....	360,000	.....
Curbing, cubic feet	2,255,770	1,859,926	2,500,000	2,000,000
Approx. equivalent in short tons	183,600	.....	200,000	.....
Flagging, cubic feet	791,660	471,837	800,000	480,000
Approx. equivalent in short tons	65,100	.....	65,000	.....
Rubble, short tons	445,210	601,208	500,000	650,000
Riprap, short tons	1,813,590	1,694,206	1,000,000	900,000
Crushed stone, short tons	43,202,840	51,717,478	52,600,000	58,000,000
Furnace flux (limestone and marble), long ton	9,525,900	9,457,946	16,600,000	13,800,000
Equivalent in short tons	10,669,000	.....	18,595,000	.....
Refractory stone (ganister, mica schist, and dolomite), short tons	496,150	643,638	600,000	720,000
Manufacturing industries (limestone and marble), short tons	2,883,090	3,801,162	5,000,000	7,500,000
Other uses	*1,728,380	*3,792,568		
Total (quantities approximate, in short tons)	63,538,740	$106,962,266	81,000,000	$118,500,000

*Chiefly agricultural limestone.



BY VICTOR J. MILKOWSKI

A notable addition of this year to the list of sand and gravel pumping plants is the plant of the Fuller-Becker Sand and Gravel Company at Oxford Michigan, within 50 miles of Detroit, its chief market.

Until this season, the plant was operated with other means of excavation and the change was decided upon by the management after an extensive investigation of many plants, both near and far. The results obtained have been such as to leave the management highly pleased with their decision.

The dredging pumps are 15 inches in diameter suction and discharge, there being two pumps connected in series. The first pump is located on the dredge and it digs and delivers the material to the second pump, commonly called the booster pump, located on shore. This booster pump delivers the material direct to the screens.

At the present time the two pumps are delivering through a total of about 800 feet of pipe against a lift of 70 feet. This length, however, can be increased to a maximum of about 3,000 feet as the material is taken out.

The plant is electrically operated throughout, using a total of about 1,000 horse power. The current is 3 phase 60 cycle 4,600 volts on the dredging pump motors and is stepped down to 220 volts for the smaller motors.

Figure 1 at top of page shows the general view of the plant. The dredge in the foreground digs and delivers the material through the pontoon line to the booster pump located in the building on shore. The booster pump delivers the material through the sloping pipe on trestle direct to the screens.

Figure 2 shows the interior of the dredge, while Figure 3 shows a close view of the booster house and of the booster pump. The two pumps are identical, being Morris 15-inch Heavy Duty dredging pumps, equipped with manganese steel wearing parts and directly connected to 400 horse power variable speed motors, 514 revolutions per minute.

The dredge is equipped to excavate to a depth of 35 to 40 feet below water surface. The suction is provided with a 45 degree elbow and with a special Morris jet head on the end. This jet head is equipped with 8 ¾-inch nozzles. Water is supplied to these jets under 100 pounds pressure from a Morris 6-inch double-suction pump directly connected to a 100 horse power motor running at 1,800 revolutions per minute.

Figure 4 shows this jet head out of the water with the jets in action. The force of these jets breaks up and disintegrates the material and provides a steady, even flow of material into the pump suction. This jet head has been found to be very ef-

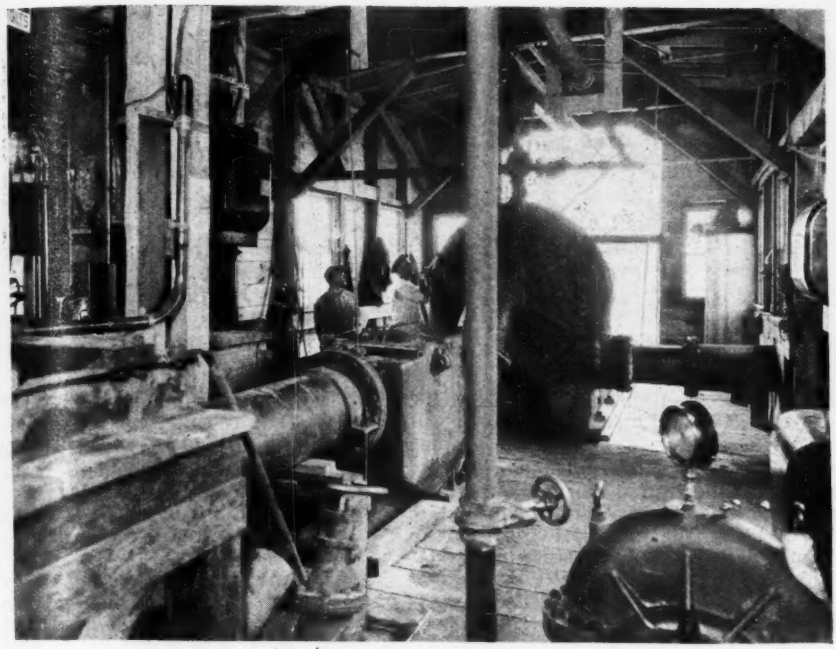


Fig. 2—Interior of dredge looking aft, showing stone box in center and 6-inch pressure pump in lower right hand corner.

fective in deposits containing seams of clay or cemented material which were too hard for the ordinary plain suction dredge.

Another special feature of this installation is the Morris stone box installed in the suction line on board the dredge. This may be seen in Figure 4 in the center. The bars in this stone box are set to catch any stone exceeding 7½ inches in diameter, and as the box is of considerable size it requires cleaning out but once or twice a day and prevents many shut-downs which would be occasioned by plugging of the suction.

The whole layout of the dredge is very simple and requires but one man to operate it. There are but three units on the dredge, the dredging pump, the jetting or service pump used also for priming and a two-drum hoist, one line being for the purpose of raising and lowering the suction and the other line for holding the dredge in position. Each of these units is driven by a separate motor and the con-

Fig. 3—Booster house and booster pump.

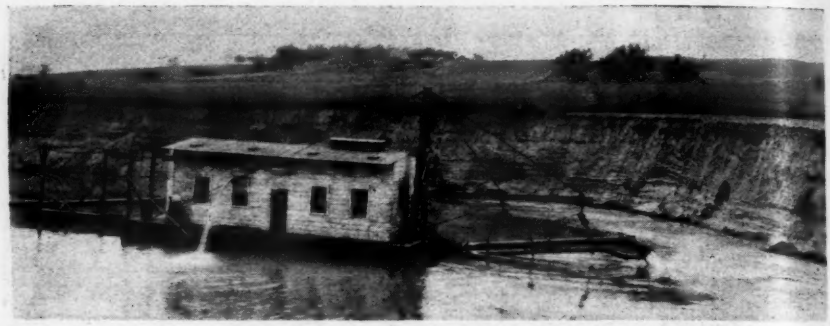


Fig. 4—Jet head out of water and jets in action.

trols are located close together within easy reach of the operator.

The screening plant is of the conventional type with conical revolving screens, with ground storage and with a tunnel and conveyor belt underneath for loading the material into cars. Figure 5 shows the screening plant and storage compartments to the right, while the conveyor belt and the loading bin are shown to the left.

The material is first discharged into cylindrical revolving screen where the oversize is taken out and conveyed to a crusher while the balance of the material with water drops through onto a wire screen about ⅜ mesh which retains the gravel while the sand and water go through. The gravel which has been retained on the screen flows by gravity to the conical revolving screens for further separation through the wire mesh screen flow into long settling troughs where the sand is drawn off on the bottom while the waste water flows back into the pond. Three grades of coarse material and three grades of sand are being produced at the present time.

The output is between 45 and 50 cars per day of about 10 hours operation. This can be increased considerably if desired by increasing the capacity of screens and of the crusher.

A company, said to be a subsidiary of the Illinois Glass Company, has purchased a large silica sand deposit at Millville, N. J., and will erect a plant costing a quarter of a million dollars. A long railroad spur is being built at the present time, just south of the town.

The Sandy Hill Sand Co., 155 Bond St., Paterson, N. J., has been incorporated with a capital of $100,000.

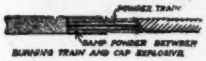
The Genesee Stone Products Company, Batavia, N. Y., has ben incorporated with a capital of $400,000. Incorporators: A. B. and N. S. and M. H. Caldwell. Attorneys: Cook & Horton, Genessee, N. Y.

Fig. 5—Screening plant, storage, and loading bin.

To Crimp a Blasting Cap

Did you ever consider that there is a right way and a wrong way to crimp a blasting cap on a piece of fuse?

For instance, DON'T crimp a cap on a piece of fuse the ends of which have been exposed to damp air, until you have cut off and discarded about an inch of the fuse. The powder core takes up moisture at the end and this damp powder refuses to burn, so that the spark from the powder train never reaches the explosive in the cap.

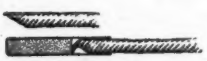


Cut off a single length of fuse at least long enough to reach 2 or 3 inches beyond the collar of the bore hole, and crimp the cap on the freshly cut end. The use of "short fuse" or "skin-'em-backe" is prohibited by law in some states. It is not only dangerous but also wasteful because you cannot tamp the hole effectively and so do not get full execution from the explosive.

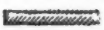
DON'T cut the fuse with a dull, dirty knife or a hatchet. It is always sure to smear some of the waterproofing in the fuse across the powder train like this:

Use a du Pont Cap Crimper to cut the fuse as it makes a straight cut like this:

DON'T cut the fuse at an angle like this. The pointed end is likely to bend over and cause a misfire.



If you use a knife, keep it sharp and clean and cut the fuse straight across as shown below:

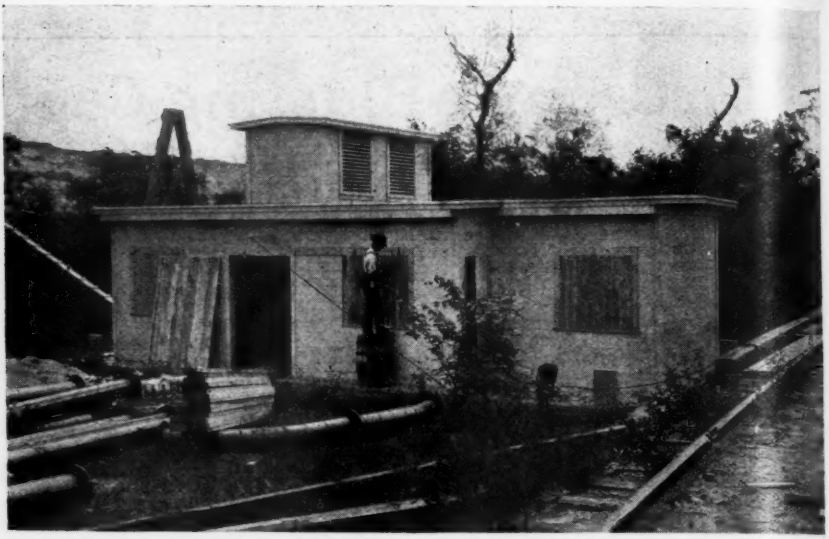


DON'T leave an air space between the end of the fuse and the fulminate in the cap as this may prevent the spark of the fuse from igniting the fulminate in the cap.

Slip the cap over the end of the fuse until the fulminate in the cap touches the end of the fuse.

DON'T crimp the blasting cap with your teeth. Men have been killed doing this, and even if you are not killed, it does not make a good tight crimp.

Hold the cap and fuse in this position and then crimp the cap as near as possible to the open end with a du Pont Cap Crimper.



Dredge of Central Michigan Gravel Co. nearing completion.

New Michigan Pumping Plant

A good deposit of sand and gravel in a section that affords fine market opportunities justifies the erection of a pretty fine plant and the establishment of facilities calculated to aid in the distribution of the product. This was no more true in the case of the Central Michigan Gravel Company, at Lansing, than it is in the case of any other similar enterprise; but the Central Michigan actually did what their prospects justified and now have a good plant just about at the point of beginning operations. This plant cannot be numbered among the big dredging operations, but it is in its own class worthy of consideration by operators whose conditions approximate those found at Lansing.

The deposit here runs to a depth of about 100 feet over 80 acres. It is comparatively free of impurities and showed up high in tests made by a number of laboratories. The sand content is in the neighborhood of 60 per cent and as such is representative of deposits in that section of the country. The features of the Central Michigan Company's deposit make possible the excavation of material from a bank or by dredging and these two means of securing materials will be employed when the new dredge is in operation. At the present time all excavation is done by a Thew steam shovel equipped with a 1-yard dipper bucket. The face against which the shovel is working is some 75 feet high and 1,500 feet long.

The presence of water in considerable quantity and the desire of the company to enjoy the advantages of a pumping operation induced the officers to plan for the building of a dredge and the erection of a land plant that would convert the product of the pumps into washed and graded materials of excellent quality. The plans were brought to the point of execution by these officers under the advice of competent engineers, notable among these being Mr. Bradley Carr of the American Manganese Steel Company of Chicago Heights, Ill. At the time that the building of the dredge was begun the company was fortunate in securing the services of an experienced dredge builder who had constructed over 100 similar craft and undertook the work with the idea of builing better, though not larger, than ever before. The finished job measures up to the highest expectations of the company and they believe that its operating future will be a very satisfactory and profitable one.

The dredge is 44 feet long and 20 feet wide and draws 2 feet of water. Construction is rather heavier than usual and considerable reinforcement is provided to equalize stresses brought about by the weight of the machinery at the ends. The deck space left over after the erection of the house which encloses the machinery furnishes a means of getting around the craft easily and allows space for working at the sides, should occasion for such work arise. The hull is built entirely of wood except for the iron used around corners and in similar ways.

The construction of the A frame and boom differs from that ordinarily encountered. Both are stationary, the A frame as seen from the side standing up vertically and the boom inclined forward at an angle of about 45 degrees to the deck. The boom is 26 feet long. It is supported by wire guys running from its end over the top of the A frame and by other guys running from the end to the sides of the craft at the deck. Control of the nozzle is had through cable running from a double drum Lidgerwood hoist, which also takes care of the shore lines that keep the dredge in position. No spuds are provided, the nature of the bottom on which digging is done, and the comparatively small size of the pond, making them unnecessary.

The pump, an 8-inch Amsco and built of manganese throughout, is located closer to a midship position than ordinarily; that is, farther back in the dredge. The operator, taking up his position close to this pump, has the hoist directly before him, and has the controls and instruments for all the equipment under his care close at hand. From this position he has also a clear view of the digging operation forward and can observe at all times just what is going on. Aft is located a 150-horsepower Allis-Chalmers motor of slip-ring type, operating at 720 r. p. m. on a 440-volt 60-cycle current. The drive to the pump is through a belt, the pulleys at motor and pump ends being of sizes that effect a reduction in speed.

An Allis-Chalmers pump is used for priming the dredging pump and for removing bilge water from below decks. This piece of equipment is powered by the motor above mentioned, as is also the double-drum hoist for the nozzle and the shore lines.

Front view of dredge.

Electric current will be supplied to the dredge by a line running along the pontoons supporting the discharge pipe. The current is purchased from a local central station. It is received at 44,000 volts and transformed to 440 volts on the company's property. The transformers are located on shore. Other equipment in connection with the electrical operation, aside from motor and controls, is located on the dredge in a house built above the pump.

The discharge line from the dredge to the shore plant will have a vertical lift of 45 feet. Operating at an expected working depth of 20 feet and keeping in mind that the delivery line to the plant will be comparatively short, it will be seen that the pump will not have to pump against much of a head at the beginning of operations.

The shore plant which will receive the 45 to 50-yard hourly capacity of the dredge is a simply designed one. The discharge from the pipe line is not handled by power after the point at which it enters the box above the screens. The progress of the material and the water by which it has been

Loading station at end of industrial railroad.

conveyed and washed will be controlled solely by gravity up to the time it is run into railroad cars.

At the top of the plant are located 4 Simplex screens made by the Simplex Screen Company of Salt Lake City. The surfaces of these screens are inclined in such a manner and arranged in such positions, one below the other, that the sand and grav.. cascades downward over them and is thus sorted into commercial sizes. The highest screen passes material under 2½ inches and throws out the oversize, which may be later of sufficient quantity to justify the installation of a crusher. The second screen from the top produces + 1 inch — 2½ inch gravel, the third + ½ inch — 1 inch, the fourth + ¼ inch — ½ inch. These several products go to bins of 20 yards capacity, each located below the screening operation.

The sand left over after the gravel sizes have been selected is passed to a sand washing tank made by the Smith Engineering Company of Milwaukee. This tank serves the purpose of cleaning and dewatering the sand and permitting its being drawn off at the bottom and sent by a chute to bins. This tank is located directly below the screens, at which point it is in a convenient position to receive the output of the last screen conveniently.

Water that is run off from the sand washing tank together with that which is eliminated earlier in the process is run into a flume along which it is conveyed to the creek from which the pond is supplied with water. In case it should become necessary at any time to provide for clearing the tail water from the flume, this can be done very easily by running it to adjoining low ground within the company's property and allowing it to run over a small dam back to the creek, after it has been well settled.

In case the company should decide to crush the oversize material it can

Side view of plant.

do so by mounting a crusher in a space left open for such use. There is on hand a 7x12 inch jaw crusher that can be used for this purpose.

The bins are arranged to permit the loading of trucks and railroad cars from the sides. Loading will be done through bin gates made by the Newaygo Steel and Iron Co. of Newaygo, Mich. The construction below the bins is of concrete. The bins themselves are of wood.

A large part of the business of the Central Michigan Gravel Company comes from the builders in and around Lansing and a great amount of the output is consequently hauled by truck. Rail shipments in certain cases effect distinct economies, and for this reason provision is made as described for bringing cars up to the plant.

Trucks cannot be brought up so easily, for the plant is located in a rather inaccessible place, so an arrangement has been made which will considerably reduce the distance of the truck haul and keep the trucks on well paved roads. This arrangement is the company's industrial railroad, 1 mile long, which runs from the plant along a scenic route through the woods to a loading station on the outskirts of the settled section of Lansing.

Along this railroad sand and gravel is hauled by a 19-ton Baldwin locomotive in 8-yard Western air-dump cars to a series of 22 concrete loading bins. These bins are loaded at the top by dumping the cars and permit drawing off of the material at the bottom through clamshell bin gates.

The plant of the Dixie Portland Cement Co., which is being erected at Hill and River St., Chattanooga, Tenn., will manufacture roofing tile in addition to hollow tile. The plant will start production in about two weeks time, and will manufacture approximately 1,000 tile per day.

Three men were injured in a blast which was set off on May 30th, at the Leatham D. Smith stone quarry at Sturgeon Bay, Wis. The blast blew the top of the bluff into the air with such force that the stones flew in showers to the stone barge Adriatic, nearly two blocks distant.

The Barry Sand Co., has been formed at Grand Rapids, Mich., with a capital stock of $10,000.

A Song of Lime

They mine me and burn me,
They crush me and churn me,
They mix me with water,
Hydrate me with care.

They barrel and bag me
And label and tag me,
Assign me to uses
Important and rare.

They use me in concrete
And stucco and mortar,
They put me in plaster,
I soften hard water.

They use me with leather,
In rubber and glass,
I'm plowed in the land
I'm spread on the grass.

I neutralize acid,
I boost the crop yield
I'm the greatest re-agent
In the chemical field.

I'm eternal, essential,
And lasting as Time,
I'm the KING of all Bases
For I am "Burned Lime."

—Warner-American News.

Phosphate Rock in 1922

According to the Department of the Interior, 2,417,823 tons of phosphate rock, valued at $10,828,346, was shipped from mines in the United States during 1922, as shown by statistics collected by the Geological Survey.

Florida, the leading State, shipped 2,058,593 tons, worth $8,347,522, more than nine-tenths of which was land-pebble phosphate. From Tennessee, 353,309 tons, worth $2,107,382, was reported including a comparatively small quantity from Kentucky, most of which was brown rock. Small shipments were reported from Idaho and South Carolina.

The Cement Building Products Company has been incorporated at Brockton, Mass., with a capital of $25,000. The incorporators include Howard L. Sampson of Whitman, William S. and Allan W. Barlow of Brockton.

The Waldo County Agricultural Lime Co., Lincolnville, Maine, has been incorporated with a capital of $10,000. President, Oren W. Riplev; treasurer, Amase S. Heal; clerk, Allen H. Miller.

Lime Kiln Thermal Efficiency

By VICTOR J. AZBE, Consulting Combustion Engineer, St. Louis, Mo.

It is an honor to address this organization and the writer expresses the sincere hope that mutual beneficial results will be obtained. Many years have been spent by the one who presents this paper in the study of combustion as applying to industrial concerns and it was only about a year and a half ago that attention and study was given to combustion as applies to lime burning, with the result that there is no question of doubt but what attention to this subject by the member companies of this organization will result, not only in saving in the fuel cost but increasing efficiency of their plants as well as improving their products.

There are few industries where so much fuel can be saved as the lime industry. On the other hand, also, there are, few industries where it is so difficult to make this saving. The difficulty is mostly due to the fact that convenient methods for measuring kiln performance are not generally known, consequently, in very many cases fuel efficiency check of any accuracy is not obtained until at the end of the year. Even when a kiln test is run and all lime and coal weighed, the test has to be of so long a duration to mean anything, that all kinds of bad or possibly good conditions were bound to have crept in and so the final results could not possibly have portrayed the best possible conditions.

As a result of the above, many lime plants waste tremendous amounts of fuel. The fuel efficiency of many a kiln is only 20 to 25 per cent, when an efficiency of 50 per cent and more is possible with proper attention. A certain large lime plant was operated for an entire year at an average efficiency of only 24 per cent. They saved some $25,000 a year by changing the firing methods, while if they would approach the 50 per cent kiln efficiency mark the saving as compared with the 24 per cent efficiency operating methods would be around $40,000 a year in fuel only.

Some lime kiln operators think they know when a kiln is right by appearances; and while it is true that an expert kiln operator can tell a great deal, his senses are not delicate enough to be able to judge combustion and heat absorption efficiency of a kiln except very roughly. The more the writer has to do with lime kilns, the less inclined he is to guess and the more he depends upon proper instruments as an aid.

When a kiln test is being run, it necessarily must be run for at least one week, during which time so many conditions may creep in that the final results tell only very little as to how the kiln should be operated for best results. To overcome this, the writer developed a method which is very interesting and should prove of value to engineers and chemists in the lime manufacturing plants.

When coal burns under a boiler, the carbon combines with the oxygen of the air to form carbon dioxide. The same happens in a lime kiln, only there carbon dioxide is also being driven from the limestone by the heat from the fuel so there are two streams of carbon dioxide, one from the coal and one from the rock. In boiler practice the carbon dioxide percentage in the waste flue gas is being determined in all modern plants because it indicates the amount of air used for combustion and is quite an important check on waste. Many boiler plants have automatic CO_2 recorders that take samples every few minutes, analyze it and record the results on a chart.

To know the carbon dioxide percentage that is escaping with the waste gas from the lime kiln is even more important. Due to the definite relation between the two mixed streams of carbon dioxide much more valuable information will be obtained than is the case in boiler practice.

With bituminous coal of the better grade, when burned under a boiler, the maximum possible percentage of carbon dioxide to be obtained would be about 19 per cent. This is without the use of excess air; ordinarily, even under the best conditions, there will be at least 4 per cent oxygen in the flue gas which is being brought in by the excess air used in burning the fuel, which reduces the CO_2 percentage to 15 per cent.

Assuming now that we are burning this fuel under a lime kiln and we would get only 15 per cent CO_2 and 4 per cent oxygen the same as we did when burning under the boiler. If

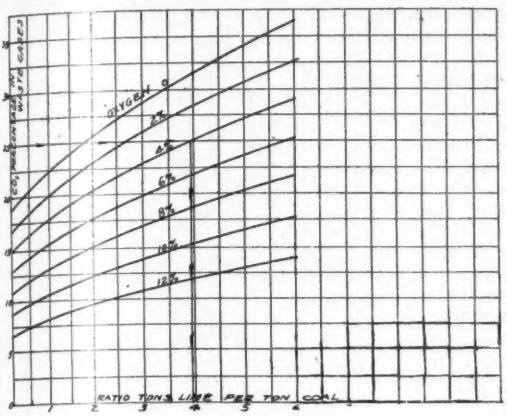


Fig. 1.—Tons of lime made per ton of coal burned.

this would occur it would be quite evident that carbon dioxide is coming only from the coal, none could be coming from the rock and no lime would be made and consequently the ratio of lime to coal would be 0-1. If the CO_2 percentage would, however, be, say, 20 per cent, and oxygen still about 4 per cent, then we immediately would realize that to obtain such a large amount of CO_2 gas from coal, when so much excess air represented by oxygen is used, is utterly impossible and so the additional carbon dioxide must be coming from the limestone.

Figure 1 was calculated on this principle. It will be noted that at 20 per cent CO_2 and 4 per cent oxygen, the ratio of lime to coal is about 2-1. If the chart is further studied, it will be noted that for the same oxygen percentage, the ratio of lime to coal increases as the CO_2 percentage increases, and when the CO_2 reduces, less lime is made per ton of coal. Consequently, the more carbon dioxide gas from the kilm, the better it is. As it was noted, the carbon dioxide is modified by the oxygen, since oxygen represents excess air, the excess air entering the kiln through holes in the fire on the grate or through the doors, or brick work, the greater will be the volume of gas escaping, and the more will the carbon dioxide be diluted.

To use the chart it is necessary to have some kind of "Orsat" gas analyzing apparatus. Then a sample should be drawn from top of kiln and main gas stream, taking great care that a true sample is obtained. The sample should be analyzed for carbon dioxide, oxygen and carbon monoxide. After the first sample, several more should be taken, preferably every ten minutes for two hours. Then results should be averaged and by referring to Figure 1, the ratio of lime to coal can be obtained for that particular kiln and for that particular period.

It will be noted that CO_2 itself, while important, requires to be supplemented by oxygen analysis. It may be also well to emphasize carefulness. If analysis look unreasonable, try and change the position of the sampling pipe, since it is extremely important that proper true average sample be obtained. At times, also, sudden results will be obtained which will look far from right. Quite often this happens, but all that may have occurred is that the fireman checked his fire, shut off the air to the grates, and the carbon dioxide percentage, instead of dropping down, shot away up, all due to the limestone continued to drive CO_2 from rock.

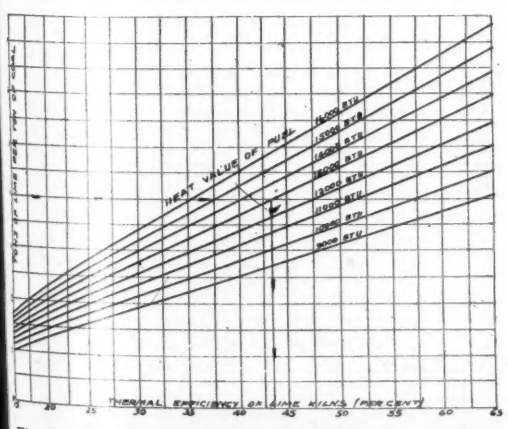


Fig. 2.—Efficiency if ratio of lime to fuel and heat value of fuel is known.

After the lime-coal ratio is determined if the

heat value of the fuel burned is also known the thermal efficiency of the kiln may be obtained by referring to Figure II. For example, assuming that the ratio is 4 to 1 and heat value of fuel 13,000 B. T. U. per pound, then by drawing lines through the respective points as shown, the thermal efficiency of 43.25 per cent is obtained. This figure means that 43.25 per cent of all heat in coal was actually used to drive carbon dioxide from limestone while the balance of 56.75 per cent was used or wasted in one or another of many different ways.

If the carbon dioxide, oxygen, carbon monoxide content percentage and temperature of the waste products of combustion escaping from kiln top is known, the most important heat losses can be determined. Under most conditions the greatest loss is that due to escape of gases at a relatively high temperature. In many cases temparature well over 1,000° F. exists, while kilns are operated with normal temperatures well below 500° F. This loss is usually called the loss due to escape of dry products of combustion, and while it varies directly with the temperature, it is also dependent to a very great extent upon the excess air use to burn the fuel, the other inleaking air either through kiln walls, poke holes or draw holes. Figure III enables one to determine this loss. It will be noted that under good conditions, represented by CO_2 30 per cent, oxygen 2 per cent, and escaping gas temperature of 600°, the loss would be 15.5 per cent. If on the other hand CO_2 would be 19 per cent, oxygen 8 per cent and temperature 900° F, the loss would be 37 per cent.

This chart emphasizes the harm done by the inleakage of too large amounts of excess air as represented by the oxygen percentage. Many kilns are operated with 10 pen cent of oxygen which represents about twice the amount of air actually necessary. This unnecessarily large volume of air passing through the kiln does damage in three ways:

(1) It necessarily escapes hot from the kiln and consequently wastes heat.

(2) It overloads the kiln gas carrying capacity useless and consequently reduces kiln capacity.

(3) It reduces temperature in the kiln due to which the heat transfer between hot flame and the lime is reduced and kiln capacity lowest.

The second condition is illustrated by Figure IV. It will be noted that the greater the oxygen percentage, the lower the kiln capacity. The principle assumed in drawing this chart is that if the air which uselessly passes through the kiln would be employed to burn fuel, more fuel would be burned and more lime made.

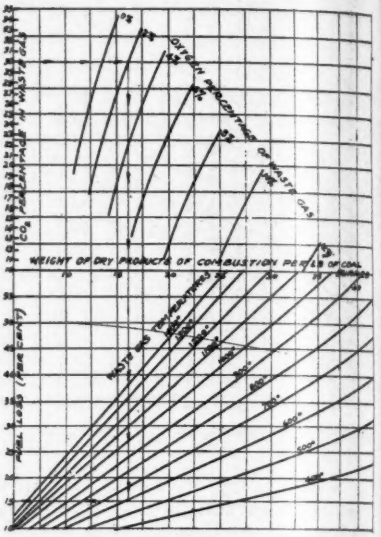


Fig. 3.—Fuel loss due to escape of dry products of combustion.

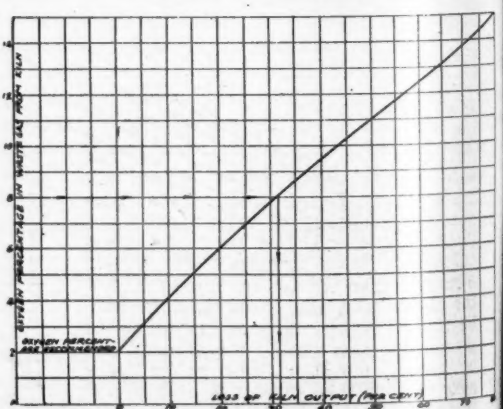


Fig. 4.—Loss of output due to excess air.

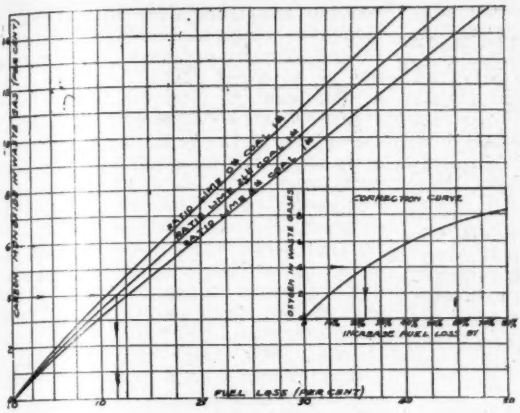


Fig. 5.—Loss due to incomplete combustion (carbon monoxide loss).

If there is a proper mixture of combustible gases and air, the vertical lime kiln should not waste any heat whatsoever, due to incomplete combustion, because conditions are ideal. The gas burns in a hot zone where there is no possibility of chilling. Due to it having to percolate through the limestone, the mixture of combustible gases and air is bound to be very complete also. The writer many times obtained gas samples from lime kilns when the oxygen content was zero and there was no carbon monoxide present. The fuel was completely burned with only a theoretically required amount or air.

As to the third condition, it may be said that it is possible to use so much excess air that the dilution would be so great that temperature would be below the temperature required to decompose limestone and so no lime would be made no matter how much fuel would be burned.

Some excess air however, is necessary, otherwise incomplete combustion, a second most important loss of heat from lime kilns, will result. This loss in some cases is so great that the gas burns to a height of 10 or more feet above the shaft kiln and at night illuminates the surroundings. Of course only gross carelessness will permit such condition, but even in plants where this does not occur the loss due to incomplete combustion at times is from 30 to 40 per cent.

The presence of carbon monoxide, a combustible gas resulting from gasification of carbon, in the waste gases leaving the kiln, indicates a loss due to incomplete combustion.

Figure V illustrates the seriousness of having as high as 12 per cent carbon monoxide in the waste gas; when this occurred the loss of fuel was about 37 per cent., all of which was preventable. Even when carbon monoxide percentage is only 4 per cent, the loss still is 11 per cent. The loss calculated from presence of carbon monoxide percentage is, however, not the entire loss due to incomplete combustion. When carbon monoxide is present, it may well be assumed that hydrogen, metahne and other very rich combustible gases are also escaping and wasting heat.

In practice, to assure complete combustion, it is necessary to use some excess air. About 2 per cent of oxygen in the waste gas should indicate a sufficient amount of air, provided this air passes with the gas through the hot zone. This amount however will be insufficient if firing is irregular. In the case of a plant where the results were tabulated, the trouble was all due to the fact that more coal was gasified in the producer, than could be burned by the air that the kiln could draw by natural draft. A

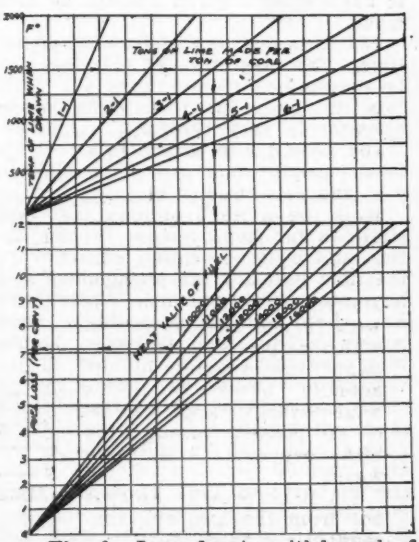


Fig. 6.—Loss due to withdrawal of hot lime.

further reason for the very bad conditions was the very infrequent firing. The producer was charged at 10:25 and again at 11:15, consequently the gas that it supplied to the kiln varied greatly in volume and since the air supply was constant, there was just barely enough air at times for complete combustion, and at other times a great deficiency.

Regular and frequent firing are extremely important in case of lime kilns. When there is heavy smoke, there is great waste due to incomplete combustion. When there is no smoke whatsoever, there is liable to be a great waste also due to the too large volumes of excess air.

There are other heat losses encountered in kiln operation but they cannot be controlled as readily as the loss due to too little air or the one due to too much air, or too high temperature of escaping gases. They are:

(1) Radiation, which can be controlled only by varying the kiln design.

(2) Loss due to moisture in air, which is very small.

(3) Loss due to moisture in rock, which loss is also very small.

(4) Loss due to escape of moisture resulting from combustion of hydrogen in fuel. This loss can be reduced slightly if temperature of escaping gases is reduced, and, also, if efficiency is generally improved, so that less coal is burned for a given amount of lime made.

(5) Loss due to withdrawing of hot lime. The magnitude of this loss can be determined from Figure VI. This loss can be reduced somewhat when operator is very careful.

(6) Loss due to carbon in ash. This loss depends upon ash percentage in coal and care used in cleaning fires.

It is the writer's opinion that possibilities for improvement in combustion and heat absorption efficiency in the lime industry are tremendous and have been barely touched. While there have been several exceedingly good papers written and delivered before this organization, the number of investigations made on lime kilns is small as compared with investigations made on boilers. As a result, it is nothing unusual to find a boiler 70 and even 80 per cent efficient, while the majority of lime kilns are operated only around 30 per cent efficient. Of course, to equalize lime kiln and up-to-date boiler performances, would require a special lime kiln construction; nevertheless, the difference, even in the case of ordinary kilns, should not be so great. The lime kiln is at a disadvantage due to greater wall area for the amount of fuel burned, consequently the radiation loss will be more than that for a boiler. Also, lime withdrawn is usually, at a red heat. But radiation can be controlled by insulation, and to offset the heat lost by the hot lime, the lime kiln has the advantage by the counter current heat flow in upper zones of the kiln and also by the much more thorough mixtures of air and combustible gas in the burning zone. One may say that a good kiln and a good boiler, both properly operated, should give equal results; also, a poor kiln and a poor boiler should give equal results. Why this is not the case is due to two reasons:

(1) In the lime industry little or no attention is paid to proper proportioning of air and fuel.

(2) Heat transfer in many cases is very poor due to ununiform size of rock charge or improperly charged rock.

I think I am safe in stating that nearly half of the fuel burned by lime manufacturers is wasted; which waste should be prevented.

The firm of Spruill & McDill of Mangum, Okla., was dissolved on April 23rd, Mr. Spruill retiring and Mr. E. L. McDill continuing the business.

The Netches Sand Co., Beaumont, Texas, has been incorporated with a capital stock of $28,000. Incorporators: Michael Storhang, Ed. McCarthy, Jr., and Peter Boade.

William M. Bennett, Kingsport, Tenn., vice-president of the Clinchfield Portland Cement Co., of that city, died May 26, at the age of 56 years. He was stricken with an attack of acute indigestion. He was a native of Bangor, Pa., and resided for many years at Nazareth, Pa.

Numerous residents of El Cerrito, Calif., have petitioned the city trustees to take action to prevent the erection and operation of a quarry in the hills near the Berkley Country Club. The first reading of an ordinance restricting buildings which will meet the request of the petitioners has been passed, it is reported.

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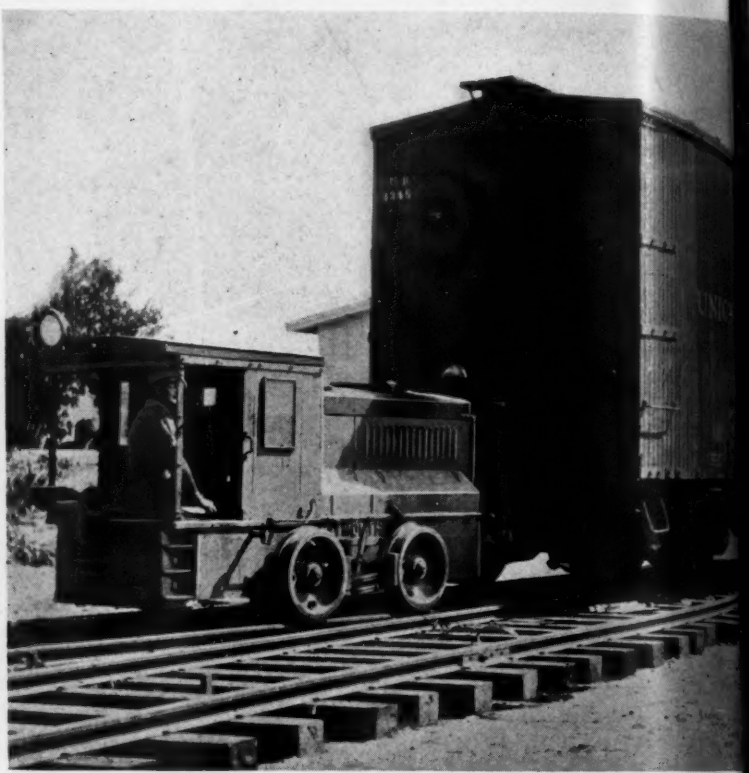


Los Angeles Rock & Gravel C

The Los Angeles Rock & Gravel Co. are building one of the largest
plants in California, having a capacity from 3000 to 5000 tons in ten h
handled from a deposit of over 300 acres, by steam shovel, boom drag
dredge.

Many carloads of equipment and lumber were hauled by a Plymouth
from siding to plant, a distance of one mile.

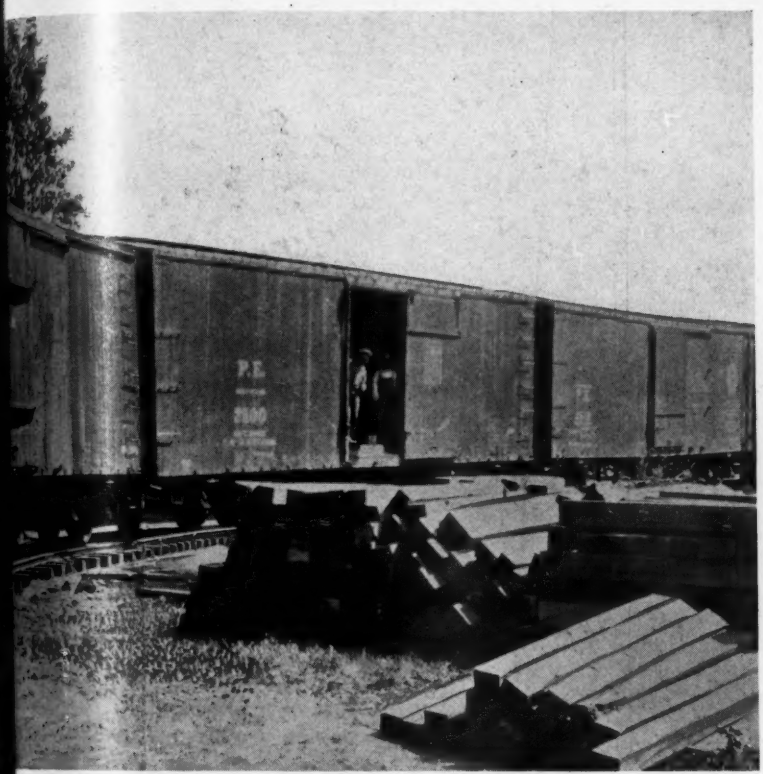
The Los Angeles Rock & Gravel Co. have since bought two more Pl
three Locomotives will be used for hauling material from the pit to
placing and hauling empty and loaded cars after the plant is in operation.

Read the letter in adjoining panel—then write us for Catalog and ot
Views.

THE FATE-ROOT-HEATH CO., PLYMOUTH,

PLYM

Gasoline



dorse Plymouth Locomotives

Los Angeles Rock & Gravel Co.
Los Angeles

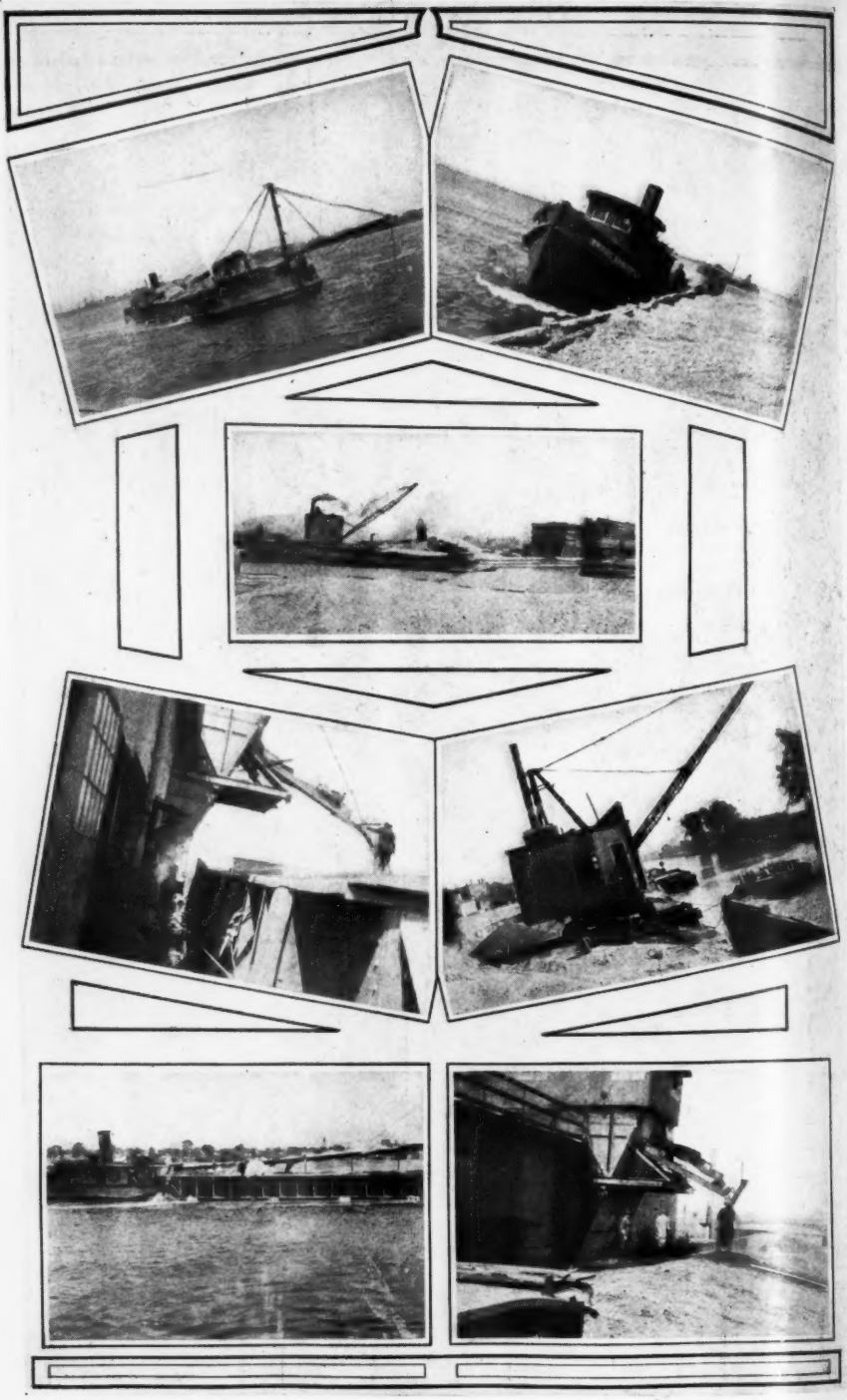
The Fate-Root-Health Co., Plymouth, Ohio.

The Seven-Ton Geared Plymouth Locomotive you sold us is giving entire satisfaction. We are using it to haul standard gauge cars on a grade ¾ of 1 per cent and have hauled one hundred and fifty tons without sand easily and would buy more if our needs demand them.

For industrial haulage it can't be beat.

Very truly yours, (Signed) H. W. HAWLEY, Pres.
LOS ANGELES ROCK & GRAVEL CO.,

O UTH
ocomotives



Some views of the dredging operations of the Empire Limestone Co., Buffalo.

Lime Convention Shows New Developments in Industry

The Annual Convention of the National Lime Association, held this year at the Commodore Hotel in New York City, accomplished a great deal of good for the lime industry; or, at least, it served the purpose of laying before the membership for discussion the results of a year's work that will redound to the advantage of lime producers everywhere. The production by the Association's technical staff of a quick setting time plaster and a lime partition block, and the extension of the uses of lime in highway construction are milestones of progress in the road that lime producers have been traveling as an association for a number of years.

The attendance at the New York meeting was not as great as it has been on some former occasions, but the reasons for this are found in the inability of some lime men to spare the time required for a trip to New York from certain far removed sections of the country. Those members who did attend made up by their enthusiasm and the manner in which they handled the work of the convention for the shortage in attendance; which shortage was, after all not great.

The first day's sessions had to do with the business of the Association and with the consideration by the membership of reports by the officers on the condition of the Association. On the morning of this day, Wednesday, June 13, the Board of Directors met at 11 o'clock and remained in session for one hour. Then followed a luncheon and the resumption of business at 2 o'clock with the entire membership in attendance. This afternoon session was opened by the address of Charles Warner, president, who gave way next to W. R. Phillips, general manager. Mr. Phillips presented his executive report. On the material thus laid before the convention was conducted an informal discussion that lasted the rest of the afternoon. No formal action on any matters was taken at this meeting, such action being reserved for the executive session on Friday.

At 10 A. M. on Thursday, the second day, Mr. Warner again opened proceedings by a short address. In it he drew attention to the fine condition of the lime business throughout the United States at the present time, as evidenced by Government reports and the statements of producers. The chemical field continues to become more and more important and the demand for lime in construction shows a healthy increase. Association work has played a large part in bringing about this desirable condition, although the results of this combined effort may not always be immediately apparent. The good that resulted comes from work that was done or, at least, begun a long time ago. One of the features of Association work that must be remembered is that its results are not produced and should not be expected immediately. In the case of individual effort this is frequently not the case. Individual effort, while looking to the future, attends mainly to the present. Association work is intended chiefly to guard the future, and the future is, after all, the most important. Mr. Warner concluded his address by announcing that it was his intention, with the expiration of his terms, to participate in Association affairs merely as a member, that the press of other business made it impossible for him to serve longer as president. He thanked the members for the co-operation he received while in office and bespoke for his successor the same loyal assistance that had been given to him.

The report of the general manager was next presented. Mr. Phillips began his talk by referring to the Association's organization plan and its

division into an executive office, a headquarters technical staff and a field service, this last division subdivided into two groups to cover the Eastern and Central territories. The efforts of all were bent toward the achievement of association ends through research, education and promotion. Activities during the past year were greatly enlarged, this made possible by the expenditure of more than twice as much as was spent the year before. The Association has now an increased number of fellowships and is keeping 12 to 15 men full time at leading institutions of learning in various parts of the country. The effort from a research point of view has been to put lime into new fields and to make it serve better the requirements of the fields in which it has found use up to this time. Mr. Phillips then outlined the activities of the executive office, the headquarters' technical staff and the field service. In the last year the technical staff has, among other things, devoted its attention largely to the production of a quick setting lime and a structural lime block, to the development of a ready mixed lime mortar plan, to the recognition of lime in roadbuilding, to the production of handbooks and other literature for operators and users for the purposes of increasing the demand for lime and of aiding in its production and sale, to the publication in technical journals of articles designed to bring technical men more closely in touch with the newer developments. The work of the field service in the Central and Western states has been gotten well under way and good results have been obtained. In the East conditions have been rather more unsettled and, because of the fact that appropriations for the work were not decided upon until later in the season, actual accomplishment has not been as much as in the other sections.

Although Mr. Phillips made no reference to the fact in his talk, it was by this time known to all attending the convention that he had resigned as general manager of the association and would shortly take up the duties of sales manager of the American Lime and Stone Company. Pit and Quarry wishes to take this opportunity to wish him well in his new venture and to add to the expressions of esteem received by Mr. Phillips from the membership its own expression. The editors of this paper have been watching Mr. Phillips' work with admiration and are sure that no better man could have been in the position of general manager during the time he held that office.

Mr. Phillips was succeeded by J. A. Slipher, the Association's soil technologist. Mr. Slipher treated first the more general aspects of the past year's work in promoting the use of agricultural lime. He told his auditors that the Association has cause for confidence as a result of the three-year effort to get more lime on the land. The resistance to liming is breaking in many quarters, largely as a result of Association activity. The present liming practice is due for a change and Mr. Slipher looks for the change to come in the direction of an increased use of burnt lime. This material is steadily getting into state after state where it has not been used up to this time. For 15 to 20 years many of the states have gone through campaigns aimed at the introduction of a liming system calling for 2 to 4 tons per acre of ground limestone of indeterminate fineness. The argument was that the work is done years later. In spite of the way it was advocated, this liming plan has not had wide use. This, said Mr. Slipher, is because the use falls far short of the need. In Ohio where ground limestone is used, and where it has the advantage of favorable freight rates, it has not been a success, and its proponents admit that it has not been. The present system of using low grade materials does not fit the farm scheme. Its shortcomings are appreciated more keenly by the farmer than its advantages. It is not good from a business standpoint. Its availability is low and the farmer has to wait too long for returns. He often has not enough capital to put on 2 to 4 tons per acre, the expense and difficulty of shipping and applying are too much for him. Application is made at a time when the demand for labor is at its peak. Modern farming calls for the cutting of labor to the limit. The plan, too, is psychologically bad. The application of 50 to 100 tons of material in the busy season with no immediate returns to be expected, strikes the farmer as bad. He is nervous at planting time and strongly disinclined to pay attention to anything else. The requirements in an acceptable system are that little labor be required, that there be little disturbance of the farm plan, that there be a small initial investment of not over $4.00 per acre,

that this investment be a short term one, that the returns be quick.

From the technical point of view, says Mr. Slipher, it is not necessary to reduce entirely all the acidity of the soil. Liming follows the law of diminishing returns. The new scheme calls for the application of but 400 to 700 pounds of burnt lime per acre or in every 3 or 4 years. The advantage of the burnt product are that the quantity to be applied is small, the action is quick, and the results are good, as the success of burnt lime in old liming sections testifies. The late successes of burnt lime in Pennsylvania and other states argue for a new day in liming practices.

The report of the construction department was given by R. P. Brown, the Association's construction engineer. Mr. Brown's paper began with an account of the nature and scope of his duties and was devoted thereafter to a report on the way in which the work was done and the results that were brought about. There is in this department a great deal of routine and special correspondence, ranging from practically form letter work to letters that require days of study. Many problems are referred to the Washington office and it is Mr. Brown's duty to solve that large part of these problems which refers to construction. Cooperation with the field force is also a large and important feature of Mr. Brown's work. The field work along construction lines is progressing well and the reports of field men are very gratifying.

Mr. Brown has during the past year represented the National Lime Association on various technical committees and before technical societies. One of the purposes, and happily one of the effects, of this representation has been to stimulate experimental work in private and public laboratories, all of which has reacted to the advantage of lime.

During the year was published the sales manual which deals among other things with construction topics. In it outlined advantages and uses of lime. The book is loose leaf in form. It is issued only to members. An issue of 15,000 copies of Bulletin 308, containing letters from engineers, has been put out. Bulletin 301 has been revised, Bulletin 300A is now ready for printing and Bulletin 305A is in course of preparation. An extensive mailing list of architects, engineers and builders has been prepared and should prove very helpful. It contains 11,200 names, all carefully selected.

Many city building codes are being revised as a result of good work by members of the field force, working with the headquarters office. These men are always on hand to prove the care of lime and answer objections brought against the material. The work of Mr. Shertzer of New York in having a favorable resolution passed by the Building officials conference was particularly mentioned. Illustrated paper before interested groups have proved of great benefit. Special work in Pittsburgh made it possible to give lime an opportunity to show up well in paving work.

At the conclusion of Mr. Brown's report the president drew the attention of the membership to the forward stride that lime in structural work has taken, as shown by the production figures furnished by the Department of the Interior. In 1921 the construction tonnage was 1,200,000, in 1922 it was 1,891,000. This represents an increase of 48 per cent and Mr. Warner expects the 1923 figures to top 2,000,000 tons.

Next came the report of the highways department, delivered by W. A. Freret, special representative of the Association. Mr. Freret referred first to the increased use of the hydrated product in road work. This has come more and more into demand all along the Atlantic seaboard states and in the Central West as far as Kansas. The big job is, of course, to have the material specified, and this was found to be difficult on many occasions because engineers had already committed themselves on the subject and could not see their way clear to back down. The argument in most cases was that it would increase the cost of construction. It is true that lime does not belong in all road jobs, and in some places the use of lime merely means the throwing away of money. But the general trend of engineering opinion is toward a greater use of the material. The hardest part of the job was a determination of the best manner of approach. In most cases the state highway engineer was seen first, then the matter was taken up with Washington. County engineers were also visited. Here Mr, Freret remarked that a great deal of good could be done by producers if they would take the matter up with county engineers in their own sections. A diffi-

cult feature of the work is that there is no such thing as uniformity of specifications. Road building requirements in the various states vary widely. A good field for lime in roads is offered by the big cities in the paving of streets and alleys. The bridge engineers are "lined up" better, and nearly all of them use lime. The value of lime in water tightening and in improving the appearance of the structure has helped greatly. There is a good field for lime in whitewashes. Some states are now whitewashing all the poles and fences along the roads. Another important place for the use of lime in road building is in sub-grade treatment. Dirt and clay roads are greatly improved by its use. The whole field of road building, says Mr. Freret, should be gone after strongly. It will more than justify the effort.

The report of the chemical director was given in person by M. E. Holmes. Dr. Holmes referred first to the Association's participation in exhibitions of various kinds, particularly the Chemical Exposition held yearly in New York City. He then spoke of work on the specifications of the American Society for Testing Materials and the important work that has been done in this direction. The chemical department has also paid particular attention to the matter of furnishing articles for the technical organs of the country, also to the work of benefiting association effort through reprints of these articles. Care has been taken to collect all literature of this and foreign countries that has any bearing upon the subject of lime. In September, 1922, Dr. Holmes discharged the duties of Mr. Phillips, during the latter's absence on association business. A certain amount of field work was also attended to in person. A visit to Monroe, Michigan, resulted in the establishment of a lime process water softening plant in that city. Personal contact also brought about the use of lime in the Fort Worth plant. Cooperative work with Mr. Elton Darling, representative of textile interests, caused 2 mills to try out lime processes, and it is Dr. Holmes' opinion that much good can be done here. The Bureau of Mines, through Dr. Oliver Bowles, has done some helpful work, and it is hoped that this is only the beginning of such co-operation. Much information has been prepared for publication and work is going ahead on a new sales manual for chemical salesmen. In addition to all this, the department has handled a great amount of correspondence along lines designed to increase the demand for lime in chemical fields. Another big work was the card indexing of all published information on lime from all parts of the world. There were many miscellaneous activities too, of kinds indicated by the assistance given a Western manufacturer in adjusting a freight rate that hinged upon certain similar uses between lime and calcium phosphate. Dr. Holmes was also pleased to report that the use of lime in glass making and water softening is on the grow.

The Chemical department is deriving a great deal of good from its fellowships in certain leading educational institutions. Much valuable work has been done outside the association's laboratory. Tests on lime in plaster and asphalt paving and tests on quick setting limes have been productive of good results. The lime tonnage in the chemical field is continually growing. Some may think this due solely to the war. This view is disproved by the reports of the Geological Survey, which show that the use of lime in post-war years is holding strong and thus indicating that its applications are now resting on a sound basis of experience and results.

"Late Developments in Quarrying" by Oliver Bowles, mineral technologist, United States Bureau of Mines, was an interesting and profitable paper. Dr. Bowles told of the work of the Bureau and the way it is endeavoring to co-operate with lime manufacturers in the solution of their problems. Questionnaires were sent to all the producers some time ago and a great deal of information has been received. The returns have been gone over, but have not yet been thoroughly analyzed. When they have been, it is certain that they will be of distinct benefit to the industry. Dr. Bowles then touched upon specific features of quarrying for kiln stone. He referred to the way in which operators differ in the use of the churn drill in high blasting. Blasting by this method usually throws down large stone and results in a mixing of the various stones in a series. The power shovel does not work out well in very many places because of the inability of the machine to sort the stone and send forward only correctly sized stone of the right

quality to the kilns. And yet there are economies that come with shovel loading that the lime plant operator would like to enjoy. Dr. Bowles suggests the use of a picking belt, a piece of equipment that has, at the present time, useful applications in other industries. With the use of this belt the operator could enjoy the advantages of shovel loading and take all the heavy labor out of the loading process. Pickers in other industries develop great skill. Their whole task on the belt is to pick out bad rock and this is, so far as the labor is concerned, an easy matter. Hand loaders are not always the careful choosers they are supposed to be. They are paid usually on a contract basis, so many dollars for so much stone, and their only interest is to get stone into the cars. Dr. Bowles thinks this method worth a trial.

Underground operation is coming more into favor with lime men, says Dr. Bowles. They see that it results in better stone and less spalls. Another matter that might be considered is the value of hand sledging. Hand sledging practice results in the production of stone that runs 78 per cent kiln size, while the crusher gives only 55 per cent of kiln size stone. Dr. Bowles advised the lime manufacturers to think of the future and ask themselves how the industry will take care of the greater proportion of fines resulting from the use of crushers. He would like to see some of the above methods tried out. The really important work must be done at the plants, not in the laboratories.

"Efficiency of Lime Burning," by Victor J. Azbe, combustion engineer, St. Louis, might better have been presented under the title of "Inefficiency of Lime Burning," for the first statement that Mr. Azbe made was that lime producers are wasting fuel in prodigious quantities. Mr. Azbe's paper is presented in full on another page of this issue.

By this time the convention proceedings had run a little ahead of schedule and it was found possible to include among the speakers in the morning sections two others who were to have led off the program in the afternoon. These two were W. A. Freret and M. E. Holmes. Their talks covered the subject of "Lime in Highways."

Mr. Freret told of the big strides that the asphalt top road is making. A road of this type calls for lime in the sub-grade, filler and top. The effects following upon the use of lime are striking and the market thus opened up is an important one, for the tonnage required is large. To express the condition in Mr. Freret's own words, "the big asphalt producers are going daffy over lime." These big producers are American firms. The amount of asphaltic material imported is very small, although the idea commonly is that most of it comes from outside the country. It is produced for the most part by the big oil companies. This is a very important field and should be well cultivated. Mr. Freret says that if things go on the way they have started, "they'll soon be making roads that are nearly all lime."

Dr. Holmes stated the problem by telling how all effort was bent on introducing hydrate instead of limestone dust. The substitution of hydrated lime for stone dust greatly increases tensile strength of the material and renders it less liable to damage through surface moving, cracking and other destructive actions. By slides Dr. Holmes showed comparisons between various materials for cementing value, tensile strength and penetration. Hydrated lime showed up to big advantage. It bears promise of correcting all the defects of road materials used up to this time, and its effects are permanent and lasting. It makes the softer bitumens more desirable materials and adds to their inherent advantages the quality of standing cold weather without cracking. This was one of the big arguments against their use, and lime seems to have solved the problem. Not so much attention has been paid to the cost factor and a commercial trial would be necessary to determine just where lime stood from this viewpoint. Dr. Holmes then gave the recommended proportions in the cases of a number of materials. His talk furnished food for considerable thought and fitted in very well with Mr. Freret's remarks to show producers what a big field is ahead of them here.

The next business before the convention was that of attending the luncheon. After partaking of a good meal, the manufacturers and their guests were privileged to listen to Mr. Leighton, of the Public Relations Department of the Eastern Railway Association. Mr. Leighton told of the

need for a more constructive attitude toward the railways on the part of the general public and of those whose dealings with the roads are more direct. The growth of the roads and the demands made upon them have been very great. There have been in the past many abuses by and against the roads. In 1907, when the act creating the Interstate Commerce Commission was passed, much power, including that of making rates, was taken away from the carriers. Still more was taken away in 1911 with the establishment of rate making bodies in a number of states. From 1900 to 1912 the roads greatly increased their mileages and the number of their cars and locomotives. Mr. Leighton outlined the causes that lead up to car shortages and stated that if the roads are to keep up with the increasing demands and make shortages a thing of the past, they must earn more. They have not been earning enough since 1920. In 1920 they made no profit and since then have been earning about 3 or 4 per cent until April of this year when, for a short time, they earned at the rate of 6½ per cent. By the end of this year the companies will have spent $1,000,000,000 on improvements. There is a great hue and cry at the present time for government ownership, but this will not be popular right now. A number of politicians, unable to achieve their ends in any other way are bent on crippling the roads as much as possible, so that the government can take them over. In concluding Mr. Leighton asked the association to urge a constructive attitude toward the railroad problem to the end that the transportation facilities of the country may be able to serve better.

The afternoon session was devoted to considerations of the lime partition block and of quick setting lime plasters. The membership had been well prepared for these discussions, for samples of blocks and plasters had been on display in the ante room from the beginning of the convention and most of the members had been given an amount of information by one or another of the technical staff. The exhibits were very complete and showed a large number of variations of the block and applications of the plaster. Many physical tests of impressive character were made in the room. It was shown, for example, how well the blocks stood fire and water.

Mr. Freret gave the first talk on the lime partition block. He recounted first the way in which the plan had been proposed by Mr. Stockett, of the technical staff, and how it had been gradually developed and a method of manufacture fixed upon. Much of the early work was done in the laboratories of the Bureau of Standards and the first blocks were produced by casting. It was soon seen that this will not be a satisfactory method and Mr. Freret, who was assigned to the task, set about developing a plan for producing an extruded block after the manner in which gypsum and clay blocks are made. Assistance in the task was secured from the International Clay Machinery Company of Dayton, Ohio, in whose shops the blocks exhibited in the ante room were produced. The machines on which this work was done had necessarily a number of makeshift features and imposed on the investigators a number of limitations which special design will remove. The tests were sufficient to show that there is every prospect of making blocks that will compare with gypsum, cement and clay and have for certain work advantages possessed by none of these others. The manufacture of lime blocks will be for the producer a new production stabilizer. The blocks may be made in a way that will fit in conveniently with the production scheme and may, when finished, be stored in the open.

With his talk Mr. Freret showed a motion picture of the work in the shops of the International Clay Machine Company. The picture carried the story from the time the lime, shavings and other materials were mixed ess and up to the time that a finished together, through the extrusion proc- product was turned out. By no other means could the story have been told as well and all the producers carried away with them a clear idea of this new development.

Next came W. E. Emley, Chief of the Lime Section of the United States Bureau of Standards, who gave the history of the Bureau's participation in the work. He told of how blocks of 3 types and of 38 different compositions were delivered for test and gave an account of these tests and their results. He outlined first the composition of the various products and described the preliminary treatment given them.

They were first dried and no attempt was made to control the heat used for this purpose. Then weights and transverse strength were determined. While the talk was going on a motion picture of Mr. Stockett making the tests was shown. Then the measure of absorption was made and the blocks were subjected to sawing and nailing tests. An idea of the permeability of the surfaces was gained and it was shown how, because of their low permeability, it would be advisable to score some of the blocks. The effect of various substances in the mixture was set forth. Asbestos, for example, makes the block stronger and tougher, but also heavier. The lime blocks are heavier than gypsum and lighter than clay tile.

Next began the discussions on quick setting lime plaster. Dr. Holmes began it with an outline of the association's work, telling how the object was not to improve the product, but merely to devise a means of making it set more quickly, without influencing its other desirable properties. It was not intended to make a stronger plaster, for lime has normally all the strength that is required, more than is had by some other substances used for this purpose. It was first attempted to produce a mixture which could be added to lime, but the technical staff did not find anything along these lines that would prove satisfactory. A mixture that would accomplish a quick set was found, but this could not be shipped easily without treatment with oil, which would have the effect of influencing the time of set for the worse. The effect of the addition of carbon dioxide was next studied and valuable results were obtained at the Massachusetts Institute of Technology where Professor R. T. Haslam, director of the Laboratory of Applied Research, conducted the investigations. The effect of burning conditions and of the addition of a number of substances also were studied. Dr. Holmes told of how hundreds of mixes were made and applied to lathe sections by a practical plasterer at the Washington laboratory of the association. The results obtained by this method were checked by Gilmore needle tests and it was found that, in all except one case, the results were practically the same. The association looked into the work done by other investigators and examined the merits of patented processes, but found here nothing that it considered desirable. The association is taking out patents on all its own developments.

Professor Haslam gave a scholarly account of the work done at the Massachusetts Institute of Technology, illustrating his statement by graphs projected on the screen. He found that, at the beginning of the investigation, there was no available information of any quantity, and that some of the information that was available had to be rejected as unsatisfactory.

Extensive and intensive investigational work showed clearly that there is only one form of lime hydrate, the monohydrate. There is no dihydrate, as had been before suspected. The effect of carbon dioxide additions under various conditions was told by Professor Haslam and clearly indicated by graphs. His paper was highly technical and can be truly appreciated only after more careful study.

F. C. Mathers, Professor of Inorganic Chemistry at the University of Indiana told of development work at his institution. He gave the reasons for set in gypsum, told how final set in lime or gypsum is due to the taking up of carbon dioxide, although neither of these substances is, when finally set, ever changed completely to the carbonate. The addition of sulphates will accelerate the set. Any sulphate will work, but it is desirable, of course, to use the cheaper ones, much as the sulphate of iron, magnesium, manganese, cobalt and nickel. With the addition of too much carbon dioxide there is no action. On the screen were shown tables giving the set with various substances, the results ranging widely apart. With some of the compounds it was desirable to use a retarder. The retarders used with gypsum were valueless. Pure sugars were found to be the best retarders. This was another scholarly and well received paper.

James R. Withrow, Professor of Industrial Chemistry at Ohio State University told the manufacturers that little results in the production of a quick-setting lime can be expected from a controlling of the burning temperatures in the kiln. Kiln temperatures must be regulated for high and low calcium, for dense and porous stones, but beyond this little can be said on the subject; that is, from the point of view of the production of a quick setting material. The complete way in which Professor Withrow pursued his studies would seem to dispose entirely

of the idea that a careful handling of the kiln temperatures will give a lime that can compare in setting time with gypsum.

After the executive session that followed Professor Withrow's talk it was learned that the following officers were elected for the ensuing year: Geo. Wood, Rockland and Rockport Lime Company, president; Fred Wittmer, Ohio Hydrate and Supply Company, vice-president; Burton A. Ford, National Lime Association, secretary; Milton McDermott, Knoxville Sand and Lime Company, treasurer.

In the evening the manufacturers were the guests of the Valve Bag Company of America. This company, as in other years, provided a banquet and entertainment of excellent quality. The East Ballroom of the Commodore Hotel held a jovial gathering that evening. The banquet was of the best, and the entertainers of the most entertaining. The complete show of the Strand Roof Review was brought in and for hours entertained the banqueters with the full show given every evening on the Strand roof.

A feature of the gathering was the presentation to Charles Warner, retiring president, of a beautiful silver service and the spoken and written thanks and well wishes of his associates. Other features were the speeches of the new president, George Wood, of "Jake" Urschel, and of Mr. Hartman of the Valve Bag Company of America. All three of these gentlemen, developing a sudden modesty, had almost to be forced to their feet to say a few words and receive the well wishes of the Association.

The proceedings on Friday were opened by a talk by Dr. G. J. Fink, research chemist of the National Lime Association. Dr. Fink summarized the work of the association in developing a quick setting lime plaster. He showed how, in place of the unsatisfactory data available heretofore, there is now a great amount of valuable information on the subject, information on which is built the splendid achievement of the association in developing this new material. He told of all the long and tedious tasks that had to be performed before anything definite could be accomplished, the listing of hundreds of materials and the receiving of information in there that would make possible the later program. Innumerable combinations had to be made and put through systematic tests. From these tests were found materials which would quicken the set, and materials which would affect the other properties of the lime. Experiments were conducted with accelerators and retarders and the value of various substances for these purposes determined. On Dr. Fink's work rests a good share of the successful results that have been obtained.

The rest of the morning was devoted to executive sessions. After these, shortly before noon the 1923 convention of the National Lime Association was an event of the past. That is, the event itself was of the past. In every other way it belongs to the future.

A Whitcomb locomotive in the plant of the Wm. E. Dee Company at Cayuga, Ind., is operating on an 11 per cent grade, pulling two cars, each with a capacity of 2 cubic yards. This grade is much beyond that for which this locomotive is guaranteed, but it is nevertheless giving excellent satisfaction.

The Newaygo Portland Cement Co., Newago, Mich., is perfecting plans for the erection of a new cement mill at Manitowoc, Wis., to be operated by a subsidiary organization, know as the Manitowoc Portland Cement Co.; the mill, it is said, will be the only such plant of its kind in the state. It will consist of a number of buildings, with power plant, machine shop and other mechanical departments, and is estimated to cost about $1,500,000. The mill will have a rated capacity of about 3,000 barrels per day. To carry out the project, the parent organization has disposed of a bond issue in the amount noted, and will use the entire fund for this purpose. The Newaygo company has recently enlarged its Newaygo mill to develop an output of 3,000 barrels daily, and is operating at full capacity, with large working force. The company is also active at its stone quarries at Charlevoix and Ellsworth, Mich. Clay H. Hollister, president of the Old National Bank, Grand Rapids, Mich., is head of the company. Others active in the organization are Frank W. Renwick, president of the Chicago Gravel Co., Chicago, Ill.; J. W. Alder, president of the American Sand & Gravel Co., Chicago; George Vits, president of the Aluminum Goods Mfg. Co., Manitowoc; and Charles C. West and L. E. Geer of the Manitowoc Shipbulding Corporation, Manitowoc.

Is Now Incorporated

Sand and Gravel Association Also Making Progress with Accounting System

(By Our Washington Correspondent)

The National Sand and Gravel Association is now an incorporated body. It was incorporated in Washington on Monday, June 18, and by reason of the incorporation places itself on a par with the largest organizations in the country. It can now sue and be sued, although as Secretary Barrows explains the Association has no desire to be sued nor will it incur a civil suit.

Secretary Barrows states that the accounting system which the Association is devising for use by its membership is progressing rapidly to completion. He states that the committee working out the system will soon have it ready to submit to the membership and it is his belief that it will offer a solution to many problems of bookkeeping and accounting which sand and gravel producers now face. It will be offered to the membership at no cost, the expense of devising the system being borne by the National Association.

When President Harding addressed thousands of Shriners during the recent convention here he impressed upon his fellow members of the order the far-reaching importance of the further development of a national system of highways. Every year of development of rapid and universal transportation, he declared, makes it more unthinkable that suggestion of disunion shall ever be tolerated again.

"The amazing mobilization of the forces which only yesterday were fighting for civilization, was possible in no small part because the roads built by the Caesars were still available for such tremendous movements," the President asserted. "If the time comes when our country has need of like mobilization in the national defense, a perfected system of highways will be one of our most powerful bulwarks."

That the business of the Nation is turning more and more to highway transportation is indicated by statistics on motor-vehicle registration, compiled by the Bureau of Public Roads. It has been frequently said that the traffic is always ready and waiting when good roads are built, and that the commercial vehicle as a class is more handicapped by lack of good roads than the pleasure vehicle. The increase in the registration of commercial vehicles, coupled with the present activity in highway construction, seems to bear out this statement in the opinion of department officials.

A good road is such a paying investment that it is the poorest kind of business judgment to do without it, according to the bureau. The bureau produces figures based upon a survey of traffic in Connectict to prove its contention. The bureau believes that there is no doubt that an analysis and comparison of the highway costs and the vehicle operating cost in any particular case will demonstrate the economy of improvement wherever the traffic is sufficient to call for any improvement at all.

Road building during the present year is expected to equal or exceed that of last year, according to the bureau. Figures are not yet complete, but the bureau believes the general outlook is considerably better than one year ago, when the railroad and coal strike loomed as disturbing factors. It is pointed out by the bureau that with road users paying a more equitable share of the cost, highway finance is placed upon a firmer foundation.

Mr. and Mrs. Frank Renwick of Chicago, Mr. Renwick being connected with the Chicago Gravel Company, are motoring through the East and on their trip the latter part of June stopped at the headquarters of the National Sand and Gravel Association in this city.

The Industrial Sand and Gravel Corp., Lawton, Okla., has been incorporated with a capital of $60,000. J. W. Eastman, Sim Sheppard and Andrew Crosby, Lawton.

F. A. Braman and Kenneth Dickerson of Riverside, California, have opened up a gravel screening plant, which they expect will have a daily capacity of about 100 yards. They expect to increase this output later.

The Sun Portland Cement Company of Boise, Idaho, are enlarging their plant, spending more than a million dollars in equipment, etc. When the work is finished the marketable output will be 1200 barrels per day.

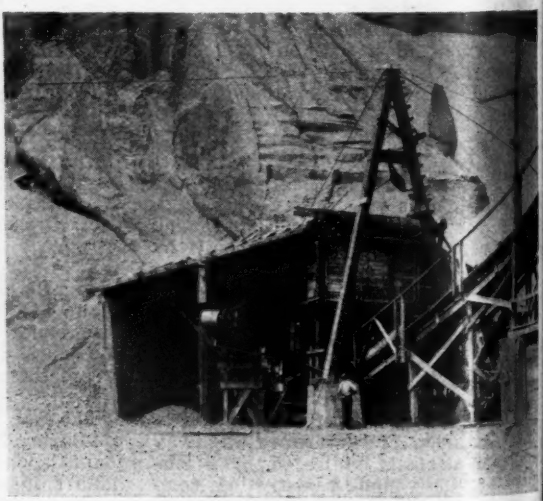
Drag Scraper Works Under Unusual Excavating Conditions

The plant of the Albany Gravel Company at Albany, N. Y., presents a number of unusual conditions which make it to the visitor an operation of more than usual interest. Located not a great distance from the business center of the city, it is an object of curiosity to many Albanians who are in some cases thus given their first real view of a modern sand and gravel operation.

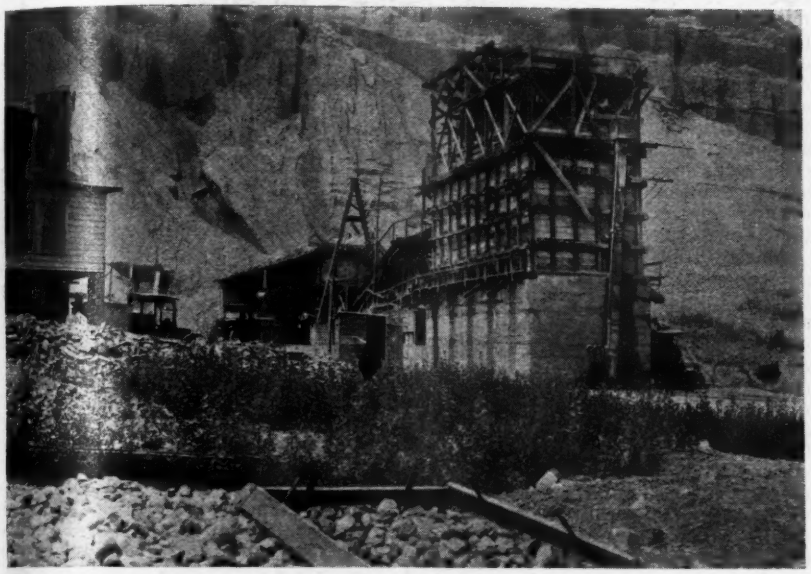
Albany is a city of hills, and it is from one of the hills that the company is excavating materials. At the present time a face of about 100 feet in height is exposed, making available a run of material that is about 60 per cent sand and contains also an amount of large stones that require crushing. The sand and gravel produced test out well for strength and other qualities and, when washed and graded, form very desirable concrete materials. The proportion of sand indicated above represents rather an over-abundance, but the surplus will be taken care of very well in a concrete block and brick plant which the company is at present erecting.

The sand and gravel, as found in the bank, is fairly compact and this feature is responsible in part for a rather unusual excavating condition. If it were looser and would flow toward the bottom readily and laid along the face at

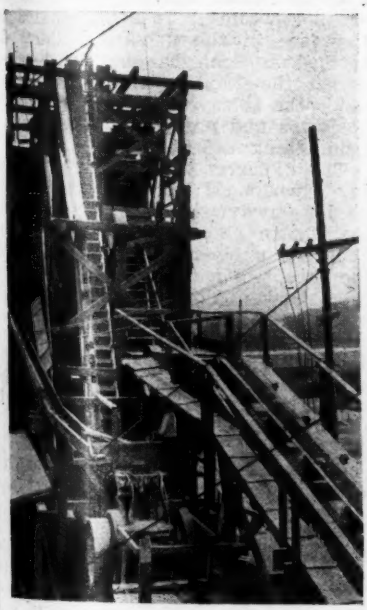
The face of the deposit at point where it is worked.



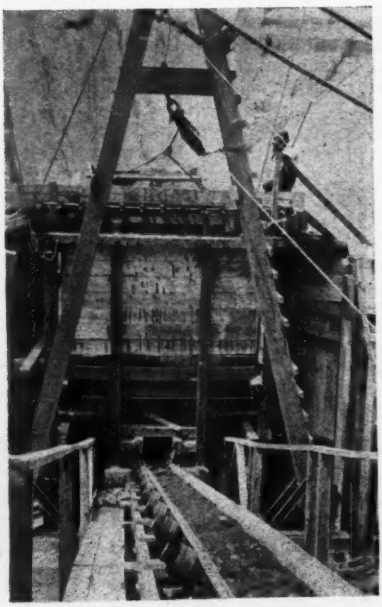
A shipping belt, installed to load bank run material from receiving hopper.



General view of plant and part of deposit of Albany Gravel Co.

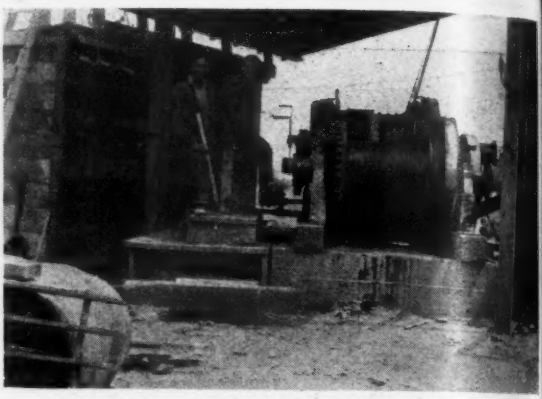


Looking at the plant from the receiving hopper.



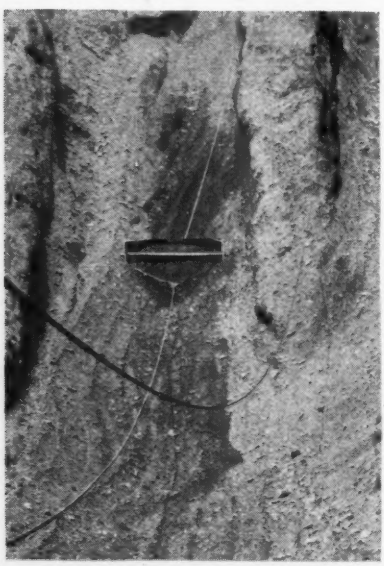
Flow of materials from receiving hopper to plant.

practically the angle of repose, it would be a much simpler matter to carry out the work of excavation. But it does not flow readily, and parts of the face, particularly at the top, are practically vertical, thus creating an unusual condition for the drag scraper that is doing the work.



The scraper is powered by a double drum hoist

At the top of the hill, a little back from the face, are located the anchorages for the cable pulling the scraper. From this point back of the face the scraper cables run to the hoist, located at the point where the material enters the plant, at a level with the bottom of the hill. For loose running material this would work out very well. The scraper would keep running up and down the side of the hill, hauling in on its downward course sand and gravel which, when removed, would make way for materials higher up to cave in and fall down into its place. But the materials higher up do not readily cave in in this case and, as a result there is a dug out space down the face and an almost vertical section at the top. Consequently the scraper, when it is being hauled back empty to the work is in the air part of the time. This makes it inconvenient to get it settled into a good digging position and subjects the scraper to additional strain because of the fact that the sides are banged at various points along the face.



Green scraper showing reinforcing bar in front.

A Green power drag scraper made by L. P. Green of Chicago, is employed as the excavating tool. As a precaution to insure against injury to the scraper while it is being hauled up the face in the unusual manner described an iron bar has been added across the front of the device. This holds the sides rigidly in their proper positions and prevents severe banging from doing injury.

The difficulty that is at present being experienced with the digging will be done away with when the company installs in place of the two low anchorages a short distance back from the face two masts located much farther back. This arrangement will make it possible to haul the scraper all the way to the top and cause it to dig right from the beginning. The entire slope will be traversed by the scraper, and this action will keep it smoothed out properly.

When material is brought up to the plant by the scraper it is drawn over a bar prizzly which knocks out the large stones and passes the rest to a large hopper about the boot of an elevator feeding a scalping screen in the plant proper. This screen passes its tailings by chute to a jaw crusher, the product of which is fed in with the regular run of material from the main hopper into which the craper discharges. After the gravel sizes have been taken out and passed to bins

the sand is sent into 2 sand washing boxes which thoroughly scrub out the impurities and pass washed and graded products to bins.

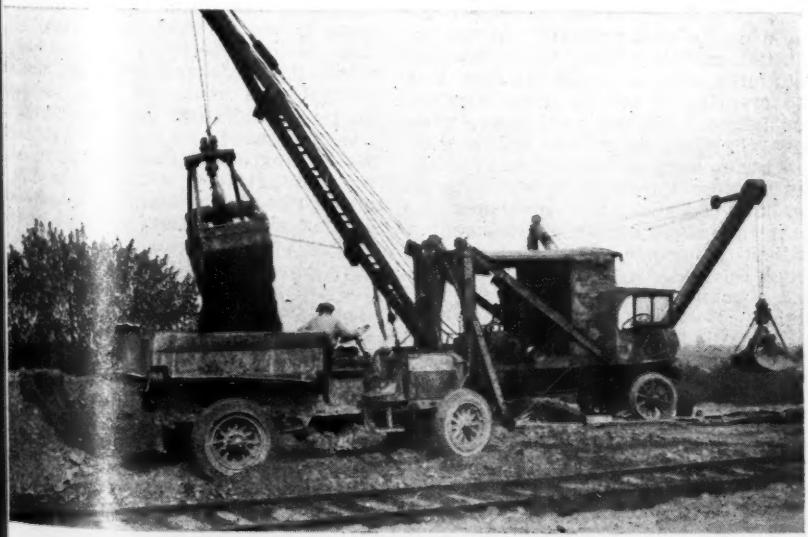
The plant was designed by the American Road Machinery Company of New York, who also furnished the greater part of the equipment. The hoist used for the scraper is a double drum machine operated direct from an electric motor.

As mentioned above, the company is working now on the erection of a concrete products plant in which they will be able to utilize their surplus materials. This plant will apparently be ready within a month or so.

Giving an idea of the nature of the deposit.

Byers Truckrane at Gravel Plant

At the gravel plant of Jaicks Bros., Batavia, Ill., a Byers Truckrane is used at any of the jobs where a crane will fit in. The fact that it is mounted on a truck body makes the crane not only a portable one, but also a device that can be sent quickly from one part of the operation to another. A view of the crane at the Jaicks plant is shown



The Lincoln Sand and Gravel Company is enjoying a great deal of success and found last season a particularly good one although in it they lost by fire the old steam dredge which the present electric dredge replaces.

The Silver Springs Sand and Gravel Company, Inc., has been formed at Silver Springs, N. Y., with a capital of $150,000. Incorporators: G. O. Spaulding, Buffalo, N. Y.

Gravel being sucked up into dewatering tank.

Fitting Plant to the Job

How One Company Has Changed Equipment Without Changing Conditions

Has an instance of the way in which a plant can fit itself to changing raw material conditions may be cited the plant of the Ohio Gravel Ballast Company at Miami Grove, Ohio, 25 miles from Cincinnati.

The history of this company's operation at Miami Grove, which is one of five of their pits located in the vicinity of Cincinnati, dates back some twenty years. For the first twelve years little difficulty was experienced in scooping up the free gravel of the moraine deposit at Miami Grove by the use of a steam shovel. At the expiration of this period, water was encountered, and an artificial lake was the creation of twelve years continuous labors. The next six years were spent in dredging in low water, until the banks were exhausted and the deposits were too deep in water to be available by the latter operation.

At this stage of the development a radical departure was necessary to reach the necessary underwater depth, and a suction pump was brought into action. Rocks and boulders weighing up to a half ton prevented entirely the successful conduct of the Miami Grove pit and would have blocked up the intake of the nozzle had it not been for the use of a Swintek traveling suction screen nozzle attached to the intake of the dredge. The traveling screen nozzle, as pictured, consists of a truss frame, on which is mounted an endless traveling chain, armed at regular intervals with rows of projecting jaws, which cut into the banks, stir up the sand and gravel allowing it to readily flow into the suction intake, while it screens out and carries away from the intake of the nozzle and the working head of the machine, boulders and rock that tend to interfere with the proper functioning of the suction pipe. The Swintek machine possibly is up against its greatest test in the Ohio Ballast operation. The boulders encountered in this moraine deposit are many and usually large, and William Donnelly, plant superintendent, states that they could not operate at Miami Grove without the apparatus.

When the picture was taken, the machine was lifted from a depth of some 35 or 40 feet, and no trouble had been experienced in pumping, while the limit under the old dredge system was about 14 feet. It may be thus understood that the company has increased its output over the whole length and breadth of the lake by about 21 feet, which is the difference between the limit of the dredge depth and the bottom reached by the Swintek machine.

The overhead has been reduced under the Swintek suction pump operation. Electricity supplied by the City of Cincinnati has supplanted the steam power and a saving is effected thereby, which in addition is augmented by the fact that the pump seldom runs idle because of a clogged up intake. Past experience has clearly indicated that the stoppage of the run of gravel due to obstructed intakes, consuming some

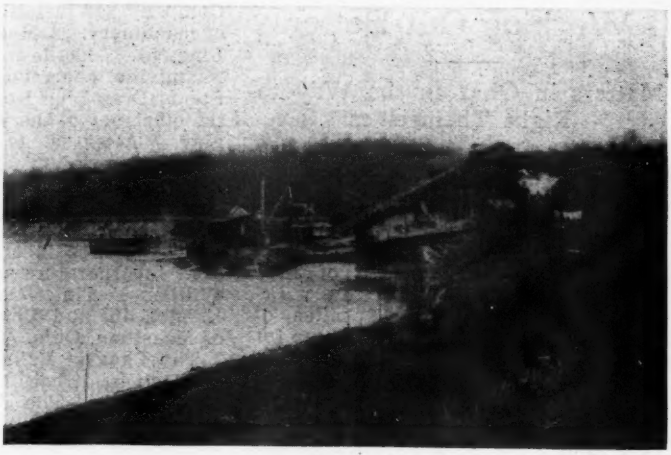
20 minutes each time and which is obviated by the traveling screen, is what causes the loss in money.

The average production of the Miami Grove operation amounts to 20 cars of 50 tons each per day of 24 hours. While this is the output when digging from the bottom of the lake at a depth of some 40 feet, the production is almost trebled when the suction nozzle is pentrating the side banks of the lake.

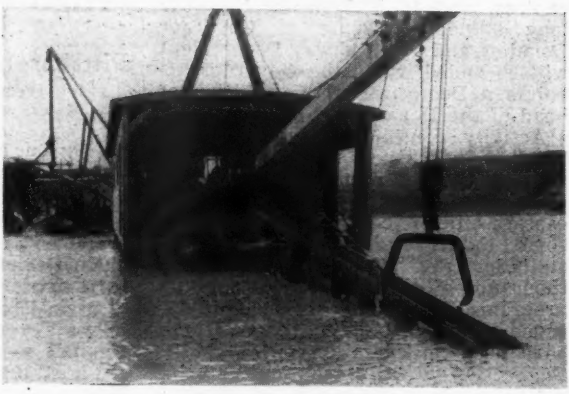
Another saving effected by the suction pump method of working the pit is the small amount of labor employed. Where there were close to two dozen men under the old dredge system, only eght men are needed to conduct the present workings.

The Swintek nozzle is 40 feet long, with a 12-inch screen, and the yield is approximately evenly distributed, 50 per cent gravel and 50 per cent sand.

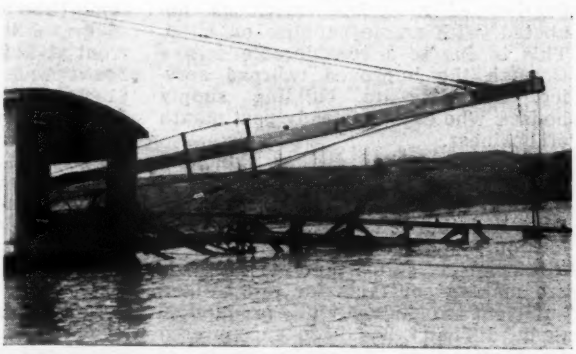
As shown in the pictures the gravel bar is sucked up through the pipe into the dewatering tank, where the water by gravitation runs back into the lake. The settled deposit of sand and gravel is then dug out by means of a large 75-foot boom stiff leg derrick, with a clam shell, and deposited in a hopper. It is fed out of the hopper by a belt conveyor which takes it



General view of gravel operation.



Front view of dredge and nozzle.



Side view of Swintek nozzle in operation.

Working Out Better

Matters in Ohio on the Way to Right Themselves

By Our Cincinnati Correspondent

Paving construction on approximately 87 miles of highway at an estimated cost of over $3,000,000 is involved in an announcement of June 15th by the Ohio State Highway Department. In addition 98 miles of maintenance and repairs will be up for bids.

The announcements of the Highway Department have met with much approval by the basic material men of Ohio and offer a large impetus for greater efforts of production. On July 1st, the tenure of office of State Director of Highways, Leon C. Herrick, expires, and it is believed that the long standing dispute of Governor Donahey and the Highway Department will be ended, when the Governor appoints a Democrat in the position of head of the Department.

Activity continues in all lines of building in southern Ohio, and it appears to be the opinion that no curtailment such as is now existing in eastern cities is considered. Where in some metropolitan centers building statistics are shown demonstrating thousands of dollars worth of building programs being suddenly held up because of high building costs, there have been no operations withheld in this section worthy of mention. Material prices continue stationary, as follows; washed gravel, $1.50 f.o.b. cars per ton, sand $1.20 f.o.b. cars, cement, $2.99 a barrel; and lime $16.80 a ton. Production of materials continues unabated, with ample supplies on hand. This is due to a considerable degree through the improved railroad service, according to building supply houses, who enjoy a steady past month of business.

The Ohio Gravel Ballast Company report their five plants at Miami Grove, Miamiville, Milford, Trenton, Ohio and their Indiana pit in full operation. Manager E. Zimmerman of this company states that the railroads are making contracts for rail ballast, sufficient to induce full production. Some difficulty has been encountered in securing an adequate supply of plant labor. The Ohio Gravel Ballast Company has installed two new pieces of machinery. A Marion Electric Drag Line No. 37 has been installed at their Miamiville operation, and a Bucyrus Steam Drag Line No. 14 has increased the efficiency of the Trenton, Ohio, digging. After a protracted trip in Florida, President Harry Donnelly is back in the Cincinnati office of the company.

The Massillon Washed Gravel Company has been incorporated for $100,000. Incorporators are, S. A. Swanson, William F. Kutz, Oscar D. Miller, E. L. McLain, and Charles E. Swanson, of Massillon, Ohio.

The Chagrin Valley Sand Company, of Cleveland has been incorporated for $10,000. The incorporators are F. W. Stanton, J. A. Fenner, Fred F. Truhler, A. M. Loveland, and W. Louis Rose.

High Point of Activity

Pittsburgh Demand at Most Encouraging Point

By Our Pittsburgh Correspondent

Activities are being maintained at a high point in the sand and gravel industry at Pittsburgh, Pa. All dredgers are busy on the rivers and large quantities of material are reaching the local market. Distribution is likewise at a good figure, with demand keeping up in a very encouraging way. The summer season bids fair to be of record-breaking proportions and producers are keeping on edge.

Prices are being maintained without important change, and it is expected that current figures will prevail for some time to come. First grade washed gravel is being sold on the waterfront at $2.00 a cubic yard, while f.o.b. float the material is quoted at $1.60 and $1.65. Delivery at site ranges from $2.50 upwards, according to length of haul. Local supply dealers are asking close to the last noted figure.

Around $1.00 and $1.10 a cubic yard is asked for good river sand, f.o.b. float, with delivery on the dock about 50 cents more. Building supply dealers are quoting the material at $2.50, delivered on the job.

In the wholesale market, cement is $2.24 a barrel, without bags; retail stocks are priced at $3.50 a barrel, with 10 cents bag allowance. Crushed stone

is selling at $2.85 in carload lots to contractors and dealers.

As an idea of current sand and gravel production in this section, it is interesting to note the figures compiled by the local Federal engineers for the month of April, recently made public. During this month, the haulage on the Allegheny River totaled 82,990 short tons of gravel, and 84,470 short tons of sand; on the Monongahela River, 113,724 short tons of gravel, and 92,792 tons of gravel; on the Ohio River, 78,396 short tons of gravel, and 91,029 short tons of sand.

The Keystone Sand & Supply Co., is operating at full capacity at its plants on the Allegheny, Monongahela and Ohio Rivers, and expects to continue on a maximum basis for an indefinite period. The company has recently secured a contract from the United States engineer's office at Pittsburgh, for furnishing 29,000 tons of gravel and 18,000 tons of sand, to be used in connection with the rebuilding of the land chamber at Lock No. 3 on the Monongahela River.

J. K. Davison & Brothers are maintaining active production at their different plants. The company has its electrically-operated sand digger, "Allegheny," working above Lock No. 3 on the Allegheny River, and is towing some heavy loads to the Pittsburgh docks from this section. The steamers "National" and "Elizabeth Smith" are busy in the later connection, as well as tending the dredge. George McC. Davison of this company has arranged to spend the summer in Colorado.

The Central Standard Sand & Gravel Co., Memphis, Tenn., has had a new stel barge constructed at the Neville Island, Pittsburgh, plant of the Dravo Contracting Co. The barge is 36 ft. wide, 175 ft. long, 10 ft. deep, with capacity of 1,000 tons, and will be placed in active service at an early date.

The Iron City Sand Co. is keeping active with its fleet and delivering large quantities of material at the Pittsburgh landing. Repairs have been in progress on the steamers, including boiler improvements, stack and other work. Present idle vessels will be placed in service at the earliest possible date.

Captain Herman Rodgers of the Rodgers Sand Co., Pittsburgh, has returned recently from Cambridge Springs, Pa., where he has been recuperating from a severe illness.

Electrical Catalogue Revised

The Westinghouse Supply Catalogue, generally regarded as an encyclopedia of things electrical, is now being distributed. This issue for 1923-24 replaces and supersedes all catalogues issued heretofore on electrical supplies by the company.

In appearance the new catalogue does not differ greatly from its predecessor. The former editions have proved so useful and satisfactory that no essential features were altered, the improvements being largely a matter of detail and refinement.

Appreciating the importance of accessibility to the specific information wanted, the utmost care was used to meet this requisite. The catalogue is indexed according to subjects and to sections, and also has a style number and a thumb index. In addition, a new feature—a classified index—has been added to the introductory section under the title "How this catalogue serves."

The catalogue announces the opening of a new plant at Homewood, Pa., which will be devoted exclusively to the manufacture of repairs and renewal parts for Westinghouse apparatus in service but of design no longer strictly standard. A complete. list of all Westinghouse sales offices, agent jobbers warehouses, and service repair shops, is also given, together with several illustrations of new combination sales, service and warehouse buildings either recently built or now in course of construction.

In all, 1,300 pages are devoted to descriptive matter technical data, dimension drawings, specifications and prices. The material includes all apparatus developed in the last two years.

I.-R. Folder

The Ingersoll-Rand Company, Easton, Pa., is now giving circulation to a new folder featuring a number of Ingersoll-Rand products, such as portable compressors, jack hammer drills, drill steel sharpeners, pumps, and hoists.

This folder is delightfully prepared and those who are not already on the mailing list for it can have it by writing to the company.

Hoosier News and Gossip

Road Building and Material Production in Indiana

By Our Indianapolis Correspondent

A total of 235 miles of roads will be constructed by the state highway commission this year, according to John D. Williams, director of the highway department. Of this mileage, 170 miles will be hard surface type, thirty-five secondary type, and thirty miles grading and building structures.

According to Mr. Williams the season's program is divided into forty contract projects. At this time eleven concrete mixers are operating in various parts of the state, and fifteen additional mixers are scheduled to start in the near future. The commission, in view of its three year construction program, is determined that 1923 building contracts shall be completed on schedule, he said.

Mr. Williams pointed out that more and more the counties are seeking state inspection, a service they are entitled to under the state highway laws. This means that while a county project is paid for by the county, plans and specifications are first approved by state highway engineers, and the actual work is accomplished under state inspection.

To date state highway inspection is in force on 41 county aid projects comprising 125 miles, the approximate cost of which is $2,254,131.95.

Refuse from washing gravel which stopped a drain tile and lessened the tillability of corn land in the river bottoms three miles north of Clinton, Ind., capable of producing 80 bushels to the acre, is the alleged basis for a venued suit against the Standard Sand and Gravel company, which has been filed in Superior Court at Terre Haute. John A. Strain is the plaintiff. Damages to the extent of $1,700 are asked. The case has been stubbornly fought in the Vermillion county court, there being a goodly number of cross complaints, answers, demurrers and all other possible actions taken and ruled on by the adjoining county courts.

Van Buren township, Daviess county, Indiana, one of the few remaining townships of the state that has no improved roads, will build its first gravel roads this summer.

A jury in a Marion, Ind., circuit court, after being out about two minutes, returned a verdict for the full amount in favor of John E. Weigel, for gravel supplied to Grant county, and the costs were assessed against John F. Pinkerman and forty representative farmers who had opposed payment on allegations that the measurements of gravel were short. The suit was a civil proceeding, and followed a report of the state board of accounts regarding what was alleged to be the reckless handling of gravel used by the county. The farmers measured the pit and introduced testimony in the attempt to prove that it showed a smaller amount of gravel had been taken out by Mr. Weigel than that for which he sought payment. The court ruled that evidence of a measurement taken six months after the official measurement was not competent unless it could be shown correctly how much gravel, if any, had been taken out of the pit after the measurement had been made, on which the defendant based his claim. The plaintiffs were unable to make this showing, and the court instructed the jury to return a verdict for the full amount of the claim, which was $8,393.54.

Testimony was introduced by Mr. Weigel to show that after measurements of the pit were taken, farmers had called at the auditor's office and had paid for gravel which they had taken out of the pit without authority. This Weigel's attorneys contended showed the reason for a difference in the first and second measurements.

The Winchester Gravel Company, with a capital of $35,000 has incorporated to do business at Winchester, Ind. The directors of the company are Ernest M. Clark, Albert E. Fudge, Everett Clark and Walter H. Fudge.

The William Francisco farm east of Ligonier, Ind., has been sold to the Milford Gravel Co., which will operate a washed gravel plant there. A spur track will be laid connecting the N. T. C. main line and extensive operations will be maintained. The company will employ 100 men continuously and will operate on a big scale. The Interstate Public Service Co. has arranged to run a line from Ligonier to Wawaka, connecting the new gravel plant with electric light and power. Machinery will be moved to the farm.

The cost of building a mile of standard, eighteen-foot cement road is about

$1,000 a mile greater this year than last year, according to Earl Crawford, a member of the Indiana state highway commission. He said stone and gravel cost about 10 cents a ton more than last year and that cement cost about 15 cents a barrel more. Stone, gravel and cement producers tell the commission increased labor costs principally are responsible for the higher prices.

Three thousand miles of gravel and stone roads in the Indiana state highway system are in the best condition since the commission was organized in 1919, according to John D. Williams, department director. Recent rains laid the dust and in many localities this type roads are like velvet, surpassing for pleasure and comfort, travel over hard surface highways. Most of this mileage came through the winter in excellent shape due to constant maintenance and a system of road drainage installed in 1921. "Our greatest problem at this time in state road work is maintaining adequate detours necessary where state roads are under construction," Mr. Williams said. Hundreds of men with motor equipment have been working on all weak spots in the non-rigid type roads.

The Collister gravel pit, Terre Haute, Ind., one time owned and operated by Mr. William Collister, has been reopened by N. G. Wallace, Frank Semour and Frank Hutchinson.

The Orange County Rock Co., has been incorporated at Orange, Calif., with a capital of $500,000. The directors are, A. G. Wright and Frank Duff, Anaheim; C. V. Barkman, Fullerton; H. B. Wright, Santa Ana; and K. M. Wright, Newport Beach.

The National Gypsum Products Co., Alamagordo, N. Mex., has been incorporated with a capital of $750,000. The incorporators are: E. F. Hoegerman, Los Angeles; P. M. Holaday, Tacoma; S. C. Rundle, Los Angeles; J. E. Fetz, Alamagordo.

The American Sand Company, Turner, Kansas, has been incorporated with a capital of $100,000. Incorporators: H. B. Thompson, R. B. O'Brien and L. W. O'Brien. They are shipping sand at the rate of from 5 to 10 cars per day.

From Southern Indiana

Activity Reported Among the Various Producing Companies

By Our Evansville Correspondent

The Interstate Public Service Company has announced it will open a large gravel pit within a short time near Columbus, Ind., from which to take gravel for ballasting the track along the company's lines. Four new ballast cars for the company are being built at Jeffersonville, Ind. Twenty-five new freight cars have been ordered to take care of the business. The gravel pit will be one of the largest in southwestern Indiana.

Sand and gravel plants along the lower Ohio and Wabash rivers are extremely busy this season and the owners say that in their opinion their volume of business is going to be much larger than that of last year. A great deal of road building going on in southern Indiana, southern Illinois and western and northern Kentucky is responsible for the increased demand for sand and gravel. Some of the sand and gravel companies along the Wabash river have increased their fleets and bought new equipment in order to take care of the additional business. The Bedford-Nugent Sand and Gravel Company at Evansville, Ind., recently took over the plant of the Evansville Sand and Gravel Company located on the Ohio River at Rockport, Ind., and the company now owns two plants at Rockport that are being operated on steady time. J. E. Wall is the superintendent of both of the Rockport plants. The combined capacity of the two plants is about 40 tons a day. The sand and gravel plant at Tell City, Ind., is being operated steadily and road building in Perry and adjoining counties is greatly stimulating the business. The sand and gravel companies at Paducah Ky., and Shawneetown, Ill., report a heavy business with the indications that trade will continue good the balance of the season or until cold weather sets in. Sand and gravel companies at Hazleton, Ind., are furnishing the sand and gravel for the construction of the new bridge that is being built across White River at that point and a fleet of towboats is being used for the purpose of carrying the material to Hazleton.

New Bulletin on Drills

Quarrymen will be interested in seeing Bulletin No. 49, recently issued by the Cleveland Rock Drill Company, Cleveland, Ohio, describing their No. 44 Rotators.

The Bulletin claims that this drill will reduce the drilling cost substantially in a number of ways, as described.

This is of particular interest from the purchaser's point of view, while

the operator likes the drill because it is well-balanced, is easy to hold on either flat or down holes, although it hits a very hard blow and shows an unusualy good day's work.

A copy of the Bulletin will be sent by the company on application.

The Graver Corporation, manufacturers of steel tanks and water softening and purifying equipment, East Chicago, Ind., has recently published a booklet descriptive of the Graver hot process water softener, which is claimed to be the best adapted for boiler feed hot water.

The principal purpose of the booklet is to compare the merits of two methods of water softening in use and to submit data from which the discriminating buyer may make his purchases for his own peculiar needs.

This is a disinterested survey, inasmuch as the Graver Corporation makes both types and can supply either one which the customer desires.

Announcement

The Orton & Steinbrenner Co., 608 S. Dearborn St., Chicago, manufacturers of locomotive cranes, dipper shovels and grab buckets, announce a reorganization of the company and the election of the following officers:

P. A. Orton, Pres. and Gen. Mgr.
E. B. Ayers, Vice-pres.
Herbert Mertz, Sec. & Sales Mgr.
Harry Shaffer, Treas. and Pur. Agt.
G. L. Niederst, Chief Engineer.
Alex Orton, Works Mgr.

No change in the management, control or policy has been made, nor is any contemplated. The reorganization is occasioned only by the resignation of Mr. H. G. Steinbrenner as president and the disposal of his interest in the company.

The Orton & Steinbrenner Co. was organized in 1906; its factory and works are located in Huntington, Ind., and main offices in Chicago, with representatives in all the principal cities of the United States and Canada.

Beginning with the manufacture of a standard gauge steam locomotive crane, the company has gradually increased its line until at the present time it manufactures eighteen standard models of cranes and dipper shovels—gasoline, electric and steam operated; ten different types of grab buckets, and five styles of coal crushers.

Since its organization the demand for its products has been so great that the size of the plant has been increased several times and at present work is being pushed rapidly in the construction of a new machine shop which will about double the present capacity.

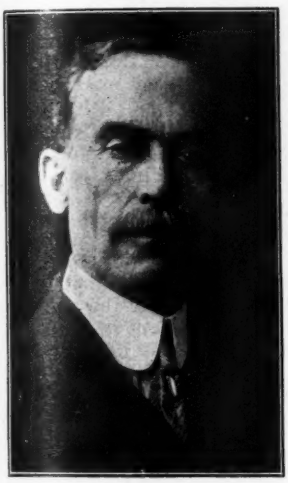
A trolley folder has just been issued covering the new Yale trolleys. It is the first piece of literature to be issued on this equipment, and contains, in addition to detailed descriptions of the plain and geared types of the new Yale steel plate roller bearing trolleys, a description of the new Yale cast-iron trolley. Incorporated in it are the details of very interesting tests to which the new steel plate trolley was subjected, and a complete list of the material-handling equipment manufactured by the Yale & Towne Mfg. Co., Stamford, Conn.

The Little River Limestone Corp. has been formed at Roanoke, Va., with a capital of $200,000.

Money In Brick Making

Many producers of aggregates have expanded their business to include the manufacture of concrete products, or have engaged in such manufacture as a separate enterprise.

Some of these have gone into brick making under the Shope patents, and others will no doubt do so after a perusal of the complete and convincing booklet recently issued by the



D. F. Shope

Shope Brick Company, Portland, Ore. This book presents a plan whereby in each city, large or small, there may be established a local industry for the manufacture of Shope brick. It also shows illustrations of many buildings put up with this material, tests which have been made, etc.

In order to provide more adequate facilities for an increasing volume of business in the Pittsburgh district, the Pennsylvania Crusher Company has recently moved its offices from the Peoples Bank Building to more adequate quarters in the Oliver Building, where operations will be continued under the experienced management of Mr. H. M. Hallett, as district manager.

The Link-Belt Company of Chicago and Philadelphia announces that Mr. L. M. Dalton has succeeded E. J. Burnell as manager of the Boston branch office.

Likes the Hand Book

We thank English Quarry Managers Journal for the kind words it has to say of our Hand Book in its last issue. We are so proud that we desire to reprint it here:

It is the only book of its kind we have yet seen in connection with the quarrying industry, and is published free to the pit and quarry industries of the U. S. A. by the publishers of the PIT AND QUARRY. Its contents are worth the attractive and durable binding it has been given, and from page 1 to page 331 it is a mine of information to the officials of sand, gravel, stone, cement, lime and gypsum pits and quarries. To quote from it is impossible, as it would hardly be fair to take a quotation from one particular section, knowing that all are of equal value; to give a list of a few of the contents in brief must be sufficient for the present:

Production of Sand and Gravel: Geology of sand and gravel, origin of deposits, etc., operating details;

Methods of Producing Crushed Stone: Some geological aspects, quarry practice, etc.;

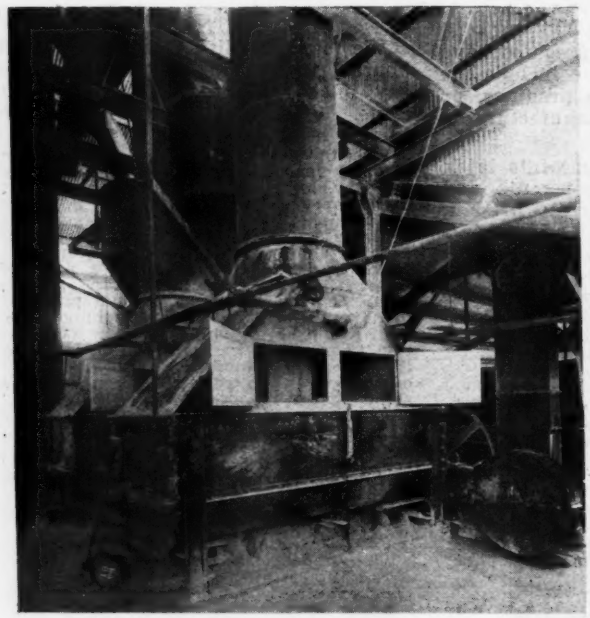
Manufacture of Portland Cement;
Talc and Soapstone;
Felspar;
Lime and Its Methods of Production;
The Manufacture of Gypsum;
Phosphate Rock and Its Production;
Silica and Its Methods of Production;
Tests of Road Building Rock;
Injuries and Their Treatment;

and a great many more, not the least valuable of which is the *Glossary of Terms*, which is a 50-page dictionary of everything connected with the industry.

We congratulate our contemporary in the issue of the most useful book to the quarry operator we have yet had the pleasure of seeing.

The Cleveland office of the Link-Belt Company has been changed from Room 429 to Number 329, and the building in which they have so long found quarters, has again changed hands and names. In the future the address of the Link-Belt Cleveland office will be No. 329 Rockefeller Building.

Uehling Instrument Company, Paterson, N. J. manufacturers of CO_2 recorders and draft and vacuum gauges, have just made two important agency appointments, namely Amsler-Morton Co., Fulton Building, Pittsburgh, Pa. for western Pennsylvania, and Mr. John A. MacDowell, 2039 Railway Exchange Building, St. Louis, Mo., for eastern Missouri and southern Illinois. Mr. H. R. N. Johnson, who formerly represented the Uehling Instrument Company in Minnesota and the Dakotas, has joined the W. P. Nevins Company, 120 South Ninth street, Minneapolis, Minn., which company is now the official Uehling representative in the territory mentioned.



New Batch Hydrator.

New Hydrator in Operation

A new batch type lime hydrator has been invented and patented by Mr. F. Weber, superintendent of the Woodville, O., plant of the Washington Building Lime Co. Two of these machines have been in operation here for some time and the results have been highly satisfactory.

While in theory the hydrating of lime is merely the simple process of mixing water and caustic lime together in proper proportions, there are practical difficulties to be overcome, so that actual experience alone enables one to know just what is desirable in a machine of this kind. Mr. Weber having had long experience in the operating end of lime production, claims a number of advantages for this hydrator, among which are:

1. Economical in first cost.
2. Low maintenance and operating cost.
3. Minimum floor space—less than 60 sq. ft.
4. Clean and quiet running.
5. Rapid charging and discharging of batches.

This machine is made in one size—to accomodate one ton of raw lime. It has been found that the great agitation obtained causes practically every particle of raw lime to be thoroughly mixed with water almost instantly; and by means of a simple design of quick acting gate, the entire batch is emptied, leaving no hydrate in the machine.

All parts are accessible for inspection and the only places needing lubrication are the four main bearings.

As will be seen from the illustration, the raw lime is fed to the machine from a hopper which automatically measures the proper batch. Water is introduced by a simple sprinkling pipe and once the correct proportion is determined for any given lime, it is automatically maintained.

Due to the quick charging and discharging of batches in this machine, it can easily take care of from five to six batches per hour.

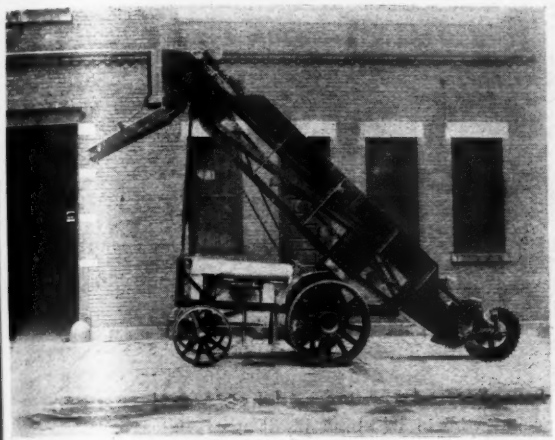
It has ben found that through the thorough agitation and even distribution of the water on the ground lime, the result is a very much more improved product.

Further information can be secured by writing to Arnold & Weigel, contractors and engineers, Woodville, Ohio.

The Pacific Lime & Plaster Co., has been incorporated with a capital of $100,000 at Sonora, Calif. The principal place of business will be San Francisco. Incorporators: C. W. Coburn, F. C. Price, both of San Francisco; C. J. Waterhouse, W. O. Badgley and R. M. Lyman all of Oakland.

The United States Gypsum Co., recently bought a large gypsum deposit in Webster County, Fort Dodge, Iowa. The tract cost $401,570, or exactly $1,000 an acre.

The Temple Silica Sand Co., has been incorporated at Harrisburg, Pa. Incorporators: Wellington B. Hunter, Charles N. Hunter and Wellington M. Bertolet.



Nelson Fordson Truck Loader

A self-feeding bucket loader mounted on a standard Fordson tractor is the latest product of the N. P. Nelson Iron Works, of Brooklyn, N. Y.

Many sand, gravel and crushed stone operators and dealers who wished to buy only one loader to load their wagons and trucks without shoveling from banks and piles which were not adjacent to each other, often expressed a desire for a loader that could move rapidly under its own power. The Nelson people can now gratify their wish with this model machine, as the tractor has a propelling speed up to 12 miles per hour.

Also, prospective purchasers of machinery often hesitate to buy an outfit with any kind of a gasoline driven power plant for fear of poor operating results; and to overcome this, the well-known Ford tractor has been adopted for this type of loader. Simple operation, low costs for power, and general efficiency are now assured.

Two novel features of this machine show a notable development of practical advantage. Instead of crawling in under the elevator, where he cannot possibly see what he is doing or digging, and surrounded by chains and sprockets, the operator now stands on a platform at the side of the machine, with all controls in easy reach and with an unobstructed view of the entire digging and loading operation. This overcomes the great difficulty hitherto experienced of keeping the performance of the loader up to its rated capacity.

The second point is no less important. By connecting the elevator direct to the engine instead of to the usual power take-off, the elevator with its powerful toothed digging spirals runs full speed, while the tractor may be inched backwards into the disappearing pile.

The capacity of the machine is 40 yards per hour of material two inches and under that a man can shovel without the use of a pick. A governor is installed to control the fuel consumption to the actual requirements. The power take-off remains available should the owner require its use for operating other machinery while the entire loader attachment can be readily removed, and the tractor used for other purposes.

A swivel spout is attached to the loader permitting discharge sideways into truck if necessary. Eight feet six inches clearance under discharge chute. General construction of machine is substantial. Elevator frame is of truss design. Elevator buckets, chains, sprockets, etc. are in keeping with regular design of maker. Those who own tractors can have the loaders mounted on them by the manufacturer.

The Boston Sand & Gravel Company, 88 Broad Street, Boston, has recently announced its entrance into the retail field, and is now dealing directly with contractors, builders, masons, plasterers, and all users of sand and gravel, maintaining for this purpose a delivery through the Atlas Trucking Company, which is a new corporation controlled by the Boston Sand & Gravel Company. Deliveries are being made from three different wharfs, serving all parts of Boston and vicinity.

The Arkansas Valley Portland Cement Company, with offices at Florence, Colorado, has acquired about 5,000 acres of lime and shale just east of the town of Concrete, Colorado, and intends to put in a plant for the manufacture of Portland cement, and will also ship commercial crushed stone.

Shovel on traction wheels in stone plant near Chicago.

Traction Wheel Mounting for Shovels

The Osgood Company has recently built, and successful tests have been made, of traction wheel mountings for one of the heaviest railroad type steam shovels. The shovel an Osgood 120, 6 cubic yards, is the largest railroad type machine ever built and heretofore they have been mounted only upon standard railroad trucks. On account of the time necessary in laying track for moving the shovel, railroad truck mountings were slow in getting from one point to another. This size shovel is much used in big rock quarries and open mines and usually when blasting operations were in progress it was necessary to lay track and move the shovel back from the face of the excavation and then up again after the explosives and had been set off. These operations were not only costly in time and labor consumed in making the changes, but also in decreased output through time lost, and steps were taken to overcome the difficulty by the Osgood Company.

Giant traction wheels were designed that measure 6 feet in diameter and have a face of 36 inches on the front or drive wheels and 30 inches on the rear wheels. The front wheels are used as drivers and power is delivered through a series of gears from the powerful hoisting engines on the shovel. Steering is accomplished by turning the rear wheels by means of a screw shaft and traveling nut. The nut, to which is attached the axle tongue, moves along the screw shaft, slewing the rear axle and wheels in the direction desired. The screw shaft is operated by a separate reversible steering engine mounted above deck alongside the boiler, out of the way yet readily accessible.

In recent tests made in a large Pennsylvania stone quarry the shovel was moved a distance in one day that under old track laying methods would have required at least ten days.

A large stone company near Chicago has just installed an Osgood 73, 3½ cubic yards traction shovel for use in the quarry. The pit is about 80 feet deep and is reached by a very steep incline. To get the new machine into the pit would ordinarily be quite a problem, but when equipped with traction wheels the problem was much simplified. With boom up and dipper and handle in place the shovel was backed down the step declivity under its own power without difficulty.

Shortly after this shovel had been placed in operation a cut of loaded dump cars was derailed when some distance from the shovel and on the way to the incline hoist. The Osgood traction shovel was thrown into gear, run down to the cars, a chain hooked over the dipper teeth and around the cars. In a few minutes the train was reralied and on its way to the hoist while the shovel went back to the rock face ready for work. It would have been necessary to unload the cars to rerail them by hand, and then reload them. While this was being done the shovel and other cars would have been standing idle if the ready mobility of the shovel had not saved the day.

KENNEDY BALL BEARING GEARLESS CRUSHERS

WHY THEY LEAD

1—They are noiseless and run like watches.

2—50% greater capacity for same power.

3—Practically no wear on anything but head and concaves.

4—Short shaft and saving in head room with packed dust collars.

5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.

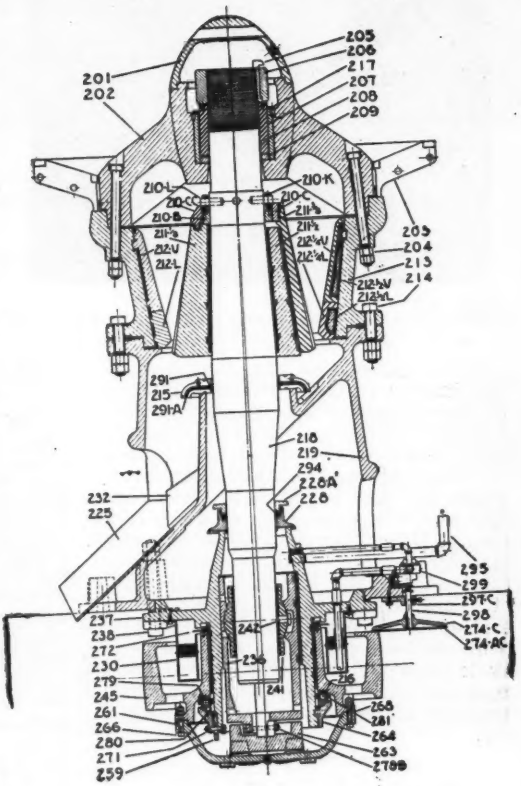
6—Can be driven right, left, or standard, as sent from shop.

7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.

8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.

9—Positive circulating oil system through filter and cut geared oil pump.

10—Made in our own shop by experts, trained for the job.



11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.

12—Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

KENNEDY VAN SAUN MFG. & ENGR. CORP.

50 Church St. **NEW YORK**

CIE. DES. ENTERPRISES INDUSTRIELLES, PARIS

Miss Claudia M. Sargeant, District Manager

The Charles Warner Company of Wilmington, Del., has recently appointed Miss Claudia M. Sargent district manager of their New York district. Miss Sargent was born in New Berlin, N. Y., and after graduating from school in Oneonta, came to New York City and was associated with the Clifford L. Miller Company—plaster manufacturers and distributors. While with this concern she had the opportunity of familiarizing herself with the operation of all departments. Miss Sargent has been connected with the New York office for a number of years and is, as far as is known, the only district manager of her sex in the lime industry.

Spring Steel Screens

A number of producers are using successfully a type of screen made from small spring steel wire.

This type of screen has two advantages: It lasts much longer, and it screens cleaner because the smaller wire cuts the clay and allows it to pass through rather than clogging the meshes.

One user reports the use of one of these screens nearly four months, during which time it handled about 300 yards per day, with the clay reduced to a minimum. These screens are manufactured by the Twin City Iron & Wire Company, 21-35 W. Water Street, St. Paul, Minn., who also handle screens of standard double crimped wire.

Mundy Car Movers

There can be no argument about the advantage of a reliable car-mover around a plant where cars have to be spotted under spouts or hoppers, or at loading platforms, and then moved away.

The Mundy car mover here illustrated, in addition to its other advantages, has an electric motor with high starting torque, making it very rapid in its action, while the vertical capstain has proved most convenient for general work such as that around sand pits and stone quarries.

Full information can be had from the J. S. Mundy Hoisting Engine Company, Newark, N. J.

The Novo Engine Company, Lansing, Mich., has produced and is distributing a new bulletin, Number 153, illustrating and describing Novo air compressor outfits. The compressors furnished with these outfits are of the duplex single stage, single acting, vertical type, and are designed to operate against pressures up to 100 pounds. In connection with each size and style shown in the catalogue is a detailed list of tools which can be operated by it so that the purchaser can easily select the size and type best suited to his uses. A distinguishing feature of the Novo unit is the particularly efficient belt drive. It is also interesting to note that individual cooling systems have been provided for both engine and compressor, and the engine can, if desired, be used as an independent power plant.

The Universal Gypsum Company has been incorporated at Rotan, Texas, with a capital of $100,000. Incorporators: C. E. Williams, L. Ford, and J. V. Gray.

The Middle Hope Sand and Gravel Co., has been incorporated at the Bronx, New York, with a capital of $10,000. J. E. Lynch, E. Long, and E. T. Carroll. Attorneys: Delehanty, Giffin, Hannon & Evans, 15 Broadway.